AGRICULTURAL BULLETIN

OF THE

STRAITS

AND

FEDERATED MALAY STATES

EDITED BY

H. N. RIDLEY, M.A., F.R.S., F.L.S., F.R.H.S.,
Director of Botanic Gardens, S. S.

AND

J. B. CARRUTHERS, F.R.S.E., F.L.S.,
Director of Agriculture & Government Botanist, F. M. S.

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CONTENTS.

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NOTICE.

The Scientific and Technical Departments of the Imperial Institute.

His Excellency the Governor has received a despatch from the Right Hon'ble the Secretary of State for the Colonies calling attention to the advantages offered by the Imperial Institute to Merchants, Planters and others, who may wish to have samples submitted to scientific experts for opinion as to their commercial value, etc. The following extracts from a Memorandum published by the Authorities of the Imperial Institute will give an idea of the work undertaken and carried on there.

"The Scientific and Technical Department of the Institute has "been established to acquire information by special enquiries and "by experimental research, technical trials and commercial valua- "tion regarding new or little known natural or manufactured pro- "ducts of the various Colonies and Dependencies of the British "Empire and of Foreign countries, and also regarding known "products procurable from new sources, and local products of "manufacture which it is desired to export. This work is carried "out with a view to the creation of new openings in trade, or the "promotion of industrial developments."

2. In an extensive and well-equipped series of Research Laboratories, a numerous staff of skilled chemists carry out the investigation of the chemical constitution and properties of new dye-stuffs, tanning materials, seeds and food-stuffs, oils, gums and resins, fibres, timbers, medicinal plants and products, with a view to their commercial utilization. Whenever necessary these materials are submitted to special scientific experts, by whom they are made the subject of particular investigation or practical tests. Reports are also obtained from technical or trade experts in regard to the probable commercial or industrial value of any such products.

3. The Federated Malay States Government has undertaken to grant a sum of £100 a year for 5 years to the Department with a view to the careful investigation and commercial development of the mineral resources of the States.

The Government Geologist is collecting specimens for chemical examination and after analysis the Imperial Institute which is in very complete touch with the principal manufacturing and other industries of the United Kingdom, will bring the specimens before manufacturers and others for trial with a view to their commercial development.

It is expected that this action will do much to help in finding a market for new products and developing the markets for those already exploited.

Planters and residents in the Straits Settlements and Federated Malay States are at liberty to send (through the Colonial Secretary at Singapore) specimens of little known or new vegetable or mineral products of the Straits Settlements or Federated Malay States for examination at the Imperial Institute by whom a report will be made, through the Colonial Secretary. Specimens should, if possible, consist of a few pounds of the material and should be accompanied by full information especially respecting the precise locality in which the material is found and the extent of its occurrence.

Attention may also be drawn to the "Bulletin of the Imperial Institute" published quarterly, which contains records of the investigations conducted at the Imperial Institute, and special articles on tropical agriculture and the commercial and industrial uses of vegetable and mineral products. Copies of this publication, price 4*s.* 6*d.* per annum (including postage), may be ordered through Messrs. KELLY & WALSH, LTD., of Singapore.

Special sample rooms have been arranged at the Imperial Institute, for the information of enquirers, in which materials which have been investigated and valued are available for reference.

Important products are also shown in the Malaya Court in the Public Galleries of the Imperial Institute.

Communications should be addressed to the Director, Imperial Institute, South Kensington, London, S.W.

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RUBBER PLANTING IN MEXICO AND CENTRAL AMERICA

By PEHR OLSSON—SEFFER, Ph.D.

Introductory.

Very little has been said or published so far about rubber planting in Mexico and Central America. So little, in fact, that people generally do not seem to know that anything is done in those countries as regards rubber, except a few erratic attempts at cultivating that much despised *Castilla* rubber tree. A short time ago I met a Ceylon planter in Japan. When our conversation turned towards rubber and I had received many tales about Ceylon, I volunteered the information that we had one or two plantations also in Mexico. He was highly surprised.

A desire to dispel some similar views, which I have found in Singapore, has tempted me to publish this article, which partly consists of some advance sheets from my small handbook, "Cultivation of the *Castilla* Rubber Tree," now in the printer's hands, and partly of data obtained from my first Annual Report from La Zacualpa Botanical Station and Rubber Laboratory, which is soon to go to press. I have added some reflexions which will perhaps give this article a rather pronounced tendency, and I have advanced some ideas which all of the Mexican planters are not yet ready to entertain.

The Name "Castilla."

I wish first to explain why I am persistently using the generic name *Castilla*, instead of *Castilloa*, to which most persons are accustomed. I go on the principle that everything should be called by its true name. The right name of the Central American rubber tree is *Castilla*. It was first described and named by the botanist *Cervantes* in 1794, and the description was printed the same year in "Suplemento à la Gaceta de Literatura." It is here written *Castilla*,

and the tree was named thus in honour of the Spanish botanist *Castillo*, who had died the previous year, while he was working on a flora of Mexico. In 1805 an English translation of the paper was published anonymously, and now the name was changed to *Castilloa*. The translator (who is believed to have been CHARLES KOENIG, the keeper of the mineralogical department of the British Museum) had no right to alter the name. A Mexican botanist had already, with just as little right, proposed to change the name to *Castella*, shortly after the plant had been described. Now we have in systematic botany certain recognized rules of nomenclature, and one of these is that of priority. As *Castilla* was the first name given, it should remain so. This question was discussed and settled in 1903 by O. F. COOK, in "The Culture of the Central American Rubber Tree" or Bulletin No. 49, Bureau of Plant Industry, United States Department of Agriculture, but it seems to have been overlooked.

Different Forms of Castilla.

Another question which is causing considerable misconception as regards our Central American rubber tree is that of species. *Castilla elastica* Cerv. in a very wide species, containing numerous forms. A species-making botanist could easily divide it into a dozen species or more. I have personally observed nine fairly distinct forms, but I still hesitate to recognize them as good varieties. KOSCHNY, a Costa Rica planter, who has written considerably in "Der Tropenpflanzer" about *Castilla* in certain parts of Central America, speaks of several "species," but does not give satisfactory descriptions that would warrant his forms to receive the distinction of species. COOK described the form occurring on and near La Zacualpa rubber plantation in Soconusco, Mexico, as a new species, *C. lactiflua*. In Hawaii I saw a form planted from seeds obtained from a seed merchant in Paris under the name var. *nicaraguensis*. It certainly was different from any other form I have seen elsewhere. *C. markhamiana* is generally considered to be a separate species, and the *Castilla* grown in Ceylon is sometimes referred to as this species. Certain is that the Ceylon *Castilla* is not identical to any Mexican *Castilla* that has come under my notice.

From the planter's point of view it is of little significance whether one or more species are cultivated so long as the rubber is obtained. But it is in this fact of the existence of many different forms in which we have to find an explanation of the reputed failure of *Castilla* in different places, where its success had been presupposed.

If we plant seeds of the *Castilla* of the Atlantic side of Southern Mexico, with an almost continuous rainfall, on the Pacific slope of the Sierra Madre, where we have a distinct dry season of six months, the tree does not succeed in growth, the amount of latex is smaller, and a planter would soon find out that he had made a great mistake, had he tried this experiment on a large scale. It seems to me probable that if attention had been paid to this ircumstance, *Castilla* would be more of a favourite than it is.

We are working on this problem at La Zacualpa Botanical Station. Herbarium specimens are secured of *Castillas* from various parts of Central America, and seeds of different varieties are being planted in the experimental plots. In due time we expect to be able to throw some light on this question. Seeds of our local *Castilla lactiflua* have been sent to various places in the West Indies, to British Guiana, Gold Coast and other places in West Africa, Ceylon, Java, Queensland, Philippines and Hawaii, and I expect to obtain reports upon the progress and development of the plant under the different conditions prevailing in these different countries.

The Geographical Distribution of Castilla.

Castilla grows wild from 21° north latitude in Mexico southward through Guatemala, Honduras, San Salvador, Costa Rica, Nicaragua, Panama, and also in North-Western South America. The area in Mexico is a belt ranging from ten to one hundred miles in width and extending from the port of Tuxpan in the north to the western boundary of Campeche, a distance of about 500 miles. The extent of the rubber belt is also rather small in Central America, where it can be said to follow the Cordilleras on both sides, while in South America it grows on the western slope of the Andes of Equador and Peru.

Castilla rubber is generally known in the market as "Centrals" but it derives many other names from the countries and localities in which it is found growing. Thus it is called Peruvian caucho, Guayaquil rubber, Barranquilla, Darien, Panama, Cartagena, Honduras, Nicaragua, West Indian, Guatemala, and Mexican rubber.

The most common species is *Castilla elastica* Cervantes, but other species such as *C. markhamiana* and *C. tunu* occur in different regions. The question of the geographical distribution of the various representatives of the genus *Castilla* is not yet sufficiently investigated.

On the Isthmus of Panama the *Castilla* is quite common in some districts. Mr. Cross writes about its occurrence in this country:—

"The Caucho tree grows, not in inundated lands or marshes, but in moist, undulating, or flat situations, often by the banks of streamlets and on hillsides and summits where there are any loose stones and a little soil. It is adapted to the hottest parts of India, where the temperature does not fall much below 74° F. The tree is of rapid growth, and attains a great size, and I am convinced that when cultivated in India, it will answer the most sanguine expectations that may have been formed concerning it. I have been up the Chagres and Gatun rivers. I came out on the railway about seven miles from Colon. I go back to the same place (the village of Gatun) from which place by the river the India-rubber forests are reached."

As to *Castilla* in Costa Rica, Mr. T. F. Koschny states :—

"The safest and most productive rubber plant is the *Castilloa elastica* of Central America. Its tenacity of life and adaptability to soil and climate are seldom exceeded by other trees ; the same is also true of the quantity and quality of the rubber."

"It requires a humid, warm climate, and with respect to rainfall less depends upon the amount of precipitation than upon the distribution of it. The shorter the dry season and the more the rain extends over the entire year the better will the locality be adapted for rubber culture; regions with a long, absolutely dry season are unsuitable for this culture. In the valley of San Carlos, Costa Rica, upon the Atlantic slope, it rains occasionally also in the dry season, and even in the two dryest months, March and April. The Pacific slope of Central America has, on the contrary, a completely dry season of four months, and two months at the beginning and end with little rain. Both the wild and the planted rubber trees die there at the third tapping at the latest, in case this takes place in the dry season."

Colins writes in his Report on the Caoutchouc of Commerce, in regard to the occurrence of *Castilla* in Nicaragua :—

"The basin of the Rio San Juan is where the Ule tree grows to perfection. This river is the natural vent of the two vast basins of the lakes of Nicaragua and Managua, receiving numerous tributaries, which have all their sources in the innumerable tracts hitherto virgin and unfrequented, and where the trees abound. The ground is very fertile. The district is very unhealthy."

Rubber Planting in Central America.

Throughout the Central American republics very little has as yet been done towards planting rubber. In most of these countries there is a great unstability of government, and foreign capital is not attracted under such conditions. Labour conditions are also very unsatisfactory on account of the frequent revolutionary movements, which sporadically crop up and draw the greater part of the able-bodied men to the ranks either of Government or rebel armies. Transportation also offers a serious drawback, and many prospective planters are deterred from settling because of the reported unhealthfulness of the climate. This latter is not worse than in other tropical countries, and with the advent of the Pan-American railroad, which will connect the south with the north, the country will be opened. In Central America there is plenty of land suitable for rubber planting. A year ago I rode for days through good rubber country in Guatemala.

In this latter republic very little planting of rubber has so far been done. In Northern Guatemala there is only one plantation of any account devoted to rubber. In the other Central American States, rubber cultivation has been commenced on a small scale. In Nicaragua there are a number of plantations, especially near the Pearl Lagoon, on the Bluefields and Escondido rivers. In Panama rubber is being planted, in Costa Rica there are a few young plantations, and in Honduras rubber has been planted

as shade for cacao. In San Salvador some rubber has recently been planted. Altogether there are in the Central American republics as far as I know 12,230 acres under rubber.

During the year 1904 the first attempts at collecting latex from cultivated trees were made in Nicaragua. These experimental tappings were made on a plantation about thirty miles north of Bluefields in the Pearl Lagoon district. The plantation is one of the oldest in the country and belongs to an American, Mr. J. C. HORTER. The trees tapped were raised in a nursery in 1897, transplanted in 1898, and in 1904, at an age of seven years, they measured 17 to 30 inches in girth and 40 to 45 feet in height. Of the 6,000 trees that were tapped the largest received three incisions, the medium-sized two incisions, and the small ones only one. The average amount of rubber per tree was one and a half ounce. Careful attention was given to the collecting and the rubber obtained was of a greater value than the ordinary "Nicaragua syrup," as the rubber of that district is commercially known. A few of the largest trees were tapped repeatedly at intervals of two weeks without apparent injury, and they yielded each time almost the same amount of rubber.

The Government of Nicaragua, a few years ago, issued a decree offering a premium of ten cents for every rubber tree planted, when the number does not go below 250 trees planted by any one person. The decree provides that the trees must be planted sixteen feet apart. Very few planters have, however, seen fit to accept this offer.

According to recent press reports the devastating cyclone, which visited Central America a few months ago destroyed most of the Bluefields plantations. It is estimated that some 450,000 well developed trees were thus broken and uprooted.

In August, this year, the Government of the Republic granted a concession to a syndicate for the revenue from the exportation of crude rubber from the Department of Zelaya and the districts of Prinzapolca and Great River. This concession is for ten years, and among other requirements from the concessionaries there is one that they are obliged "to employ only expert rubber cutters "who strictly comply with the requirements of Article 11 of the "Regulations of October 15, 1901, which say: 'It is prohibited to "make incisions into the trees to the extent of penetrating the "woody part. Incisions of more than one-half of the circumference "of the trunks or limbs of the trees are also prohibited.' The "contravention of this article shall be punished by a fine of $5 for "every tree damaged." On account of this concession it is now required that a planter who wants to export his rubber, must produce at the custom house a certificate from the authorities of the district where the plantation is situated specifying the locality whence the rubber comes. The Government of Nicaragua has imposed a tax of 5 cents on every pound of rubber exported from the country.

In the value of exports rubber appears as the fourth. All of this is collected from wild trees. The amount shipped from San Juan del Norte to United States in 1905 was 473,389 pounds.

On the cacao estates in the Rivas district rubber trees have been planted as shade. In Costa Rica rubber has not proved a success as shade for cacao. In this latter country rubber is cultivated near the coasts and on the Nicaragua frontier. Several varieties of *Castilla* are grown, but the plantations are not yet in bearing, so that definite results as to the yield of these forms are still uncertain. In 1905 about 160,000 pounds wild *Castilla* rubber was exported from this country.

Planting in Mexico.

One of the first attempts to cultivate rubber in Mexico was made by the Hon. MATIAS ROMERO, who in 1872 planted 100,000 trees near Suchiate River in Soconusco, on the Guatemalan border. The owner had to abandon the place for political reasons and the plantation was gradually destroyed by native rubber collectors and by fire, so that at present there is hardly any trace left. On the identical spot of the old plantation a new one has been started in recent years by a relative of Señor ROMERO. When I visited the place, about a year ago, it was in a thriving condition. Some thirty years ago Don EUGENIO SANCHEZ on the Teapa river in the State of Tabasco planted the first rubber trees. After that the PRATT and ALFARO families planted rubber, and about 22 years ago most of the farmers in the Teapa and Pichucalco valleys commenced to plant extensively. For the past twelve years there has been a steady increase of the planted area. In the Rio Seco Valley, DON AUGUST LITZOFF has now about 100,000 trees, two to nine years old.

On the upper Grijalva, above Huimanguillo, there is a line of farms for about 30 miles; most of these are tapping 10 year old trees. Señor ABALOS, of Huimangillo, cropped an average of 14 ounces rubber from his 10 year old trees last year.

All this was done on a comparatively small scale, however, the plantations being in Mexican hands not consisting of more than a few thousands or tens of thousands of trees. About 18 years ago a number of rubber trees were set out as shade for cacao on La Zacualpa, in Soconusco, by the then owner Señor PALAEZ. Of these there are some 1,000 trees left, and they have been regularly tapped for many years, the trees now presenting a very scarred appearance as a result of the primitive method of tapping employed by the native huleros.

Less than ten years ago American capital was attracted towards rubber planting in Mexico. As a result of this movement we have to-day approximately 100 plantations, entirely or partly devoted to rubber. I have in my possession letters and data showing that the whole area under rubber in Mexico to-day (December 1, 1906) is at least 82,620 acres. I think it is safe to say 90,000 acres. Next year's planting, at a low estimate, will be 10,000 acres. In this total I have not included what "has been" planted, but is no more. And I do not believe the entire area mentioned above can be counted upon to become producing.

In order to explain this I have to mention that it is estimated that this area under rubber represents at least £6,000,000, that are nominally invested in rubber plantations. A considerable part of this money has never reached Mexico, but has been squandered by promoters in America. A very large amount has also been lost through the ignorance of many so-called planters and plantation managers.

Rubber Cultivation in the Experimental Stage.

While I am willing to admit that rubber culture has passed the experimental stage so far as the possibility of producing rubber is concerned, it cannot be denied that in regard to proper agricultural methods this industry is still in its undeveloped childhood.

It has been clearly demonstrated in the progress of many agricultural industries, that very little advance is made before the persons concerned have learned to appreciate the value of co-operation for the purpose of comparing their individual experiences and to take advantage of knowledge gained by previous experiments. Among the rubber planters and plantation managers in Mexico and Central America there is no co-operation whatever. Everyone is satisfied that he has employed the right methods of planting, although in most cases he started in without any previous experience. The correct methods are by no means ascertained beyond any question of doubt at present. But if a person visits a great number of plantations in different districts or countries, he cannot fail to observe some of the advantages or disadvantages of the various methods employed.

We may be able to advance certain theories regarding planting operations, we know that the rubber tree under certain conditions will grow well, we may be able to extract and prepare a certain amount of rubber from the trees, but we cannot yet say which method of growing rubber will give the largest possible return, we do not know whether the most rapid grower is the best producer, and in regard to the manner of obtaining the rubber we still remain on a very primitive footing.

The experimental era of rubber culture, instead of being short and inexpensive, is growing too long for these modern times and it has certainly been unnecessarily costly. Where the experiments should have been conducted on a small scale by persons specially prepared to do this kind of work, the whole *Castilla* planting industry has been one colossal experiment, in which millions of money have been staked on the integrity, possible intelligence, and probable good fortune of men, who in many instances have lacked every experience of tropical planting, and in some cases had not even been in the tropics before undertaking the management of a plantation. Millions have thus been literally thrown away, companies have gone bankrupt, and plantations have been abandoned. Those that have survived up to the present time will in due course become a success, at least in the majority of cases. Exaggeration has been the keynote in the promoter's circulars, and inexperience the cause of most failures.

Some Mexican Plantations.

I have in a previous publication (Bulletin II, La Zacualpa Botanical Station, "Notes on Rubber Culture in Mexico") tentatively divided Mexico into a number of rubber districts, the northernmost being that of Tierra Blanca, in the State of Vera Cruz. The number of plantations in this district is small. Among these may be mentioned Hacienda Yale, owned by a number of former students of Yale University, and La Esperanza, first started by Mr. Geo. Cullen Pearson, representing British capital.

Not far from Perez station on the Vera Cruz and Pacific railroad is the Playa Vicente district, containing several small plantations. In this neighbourhood, along the Papaloapan river, are a number of othei rubber plantations which all can go under the name of the Tuztepec district.

Further south, and not very far from Santa Lucrecia we have the important Trinidad River district. This is often included in the general term of "the Isthmus," but conditions are in many respects differing from those on the Isthmus proper. This latter is a very large district comprising the rubber country along the National Tehuantepec railroad, and along the Coatzacoalcos river or its tributaries.

One of the largest plantations on the Isthmus is Rubio, situated some distance from the township of Minatitlan. It is owned by the Tehuantepec Rubber Company of New York. Its able manager is Mr. A. B. Luther, who has had a long Merican experience, and also has studied conditions in the South American rubber districts. Rubio plantation has some 3,000 acres under rubber. Oaxaqueña, Colombia and Del Corte are some of the other larger rubber plantations in the district.

In the Trinidad River district the largest plantation is La Junta, owned by the Mexican Mutual Planter's Association, of Chicago. It has some 4,500 acres under rubber besides a large acreage in coffee and cacao. Its manager is Mr. J. C. Harvey, who also is part owner of an adjoining rubber plantation, Buena Ventura. Here Mr. Harvey, who is very much interested in botany, has a small botanic garden of his own, the only one, in fact, in the country. Some fifty different species of palms, a good sized collection of native and foreign orchids, many economic plants, and ornamental trees and shrubs surround his house. The only Para trees yet grown in Mexico are to be found here, and are Mr. Harvey's special treasures. Many of the trees and plants in this collection are raised from seeds obtained from Singapore Botanic Gardens, with the Director of which Mr. Harvey is in frequent correspondence.

Another very extensive rubber district is situated along the Grijalva river, and the Usumacinta river system constitutes a district covering a large area. Lastly on the Pacific slope of Chiapas, between the towns of Pijijiapan and Tapachula, we have the Zacualpa district, very limited in area.

Some eighteen years ago *Pelaez*, then owner of La Zacualpa, in Soconusco, planted rubber as shade for cacao, and of these trees

a number are still left and are being tapped every year. In 1899 Mr. O. H. Harrison, a coffee planter, bought Zacualpa and immediately commenced planting rubber. The plantation which was later transferred to La Zacualpa Rubber Plantation Company, of San Francisco, California, is now probably the largest individual rubber plantation in the world, and will when ultimately completed consist of 12,000 acres under rubber. The variety grown is *Castilla lactiflua* Cook. In 1905 the first tapping from young trees was done, some 25,000 trees, between five and six years old, being lightly tapped. Six other rubber plantations have been started of late years in this district, two of which, Juilapa and Zacualpa II, are also under the general direction of Mr. Harrison. These three sister plantations have now over 8,000 acres under rubber, varying in age from 6 months to 6½ years.

In order to show how rubber planting is done in Mexico, and how we expect to handle the plantations and the crop of latex and rubber, I will describe somewhat in detail the conditions on La Zacualpa, and the methods which the management at my suggestion intends to adopt for the future.

La Zacualpa Rubber Plantation.

The estate which consists of 18,791 acres of land is situated on the coastal plains between the Sierra Madre and the Pacific Ocean, about twelve miles from the latter. The land slopes very gently towards the ocean, and the highest spot of the rubber plantation is about 50 feet above sea level. Two small rivers flow on the outskirt of the estate, which is intersected by several creeks. Part of the land is swampy, and is not planted in rubber.

The plantation is laid out in square blocks, each containing 27¾ acres. There are now over 200 blocks planted. Between the blocks are roads 24 feet wide. The trees are planted 400 to the acre, and admitting some failures, each block should contain 10,000 trees. On account of the lay of the land the planted blocks are in two tracts, one about twice the size of the other. All roads going lengthwise in the tract are called avenues and all cross roads streets. The longest avenue is nearly six miles through the planted rubber forest.

The soil is an alluvial deposit of dark colour, of uniform grain size, without any interrupting strata of different physical texture. In the places where borings have been made to ascertain the depth of the soil it has varied from 18 to 22 feet. Because of the physical character of the soil the rise of water from below by capillarity is continuous and even in the dry season, which lasts six months, the trees do not suffer from lack of water. The root system of *Castilla* on this soil is superficial. In other districts, where the soil is stratified, I have found that the roots penetrate much deeper in order to reach the water-supply. Laboratory experiments have shown me that roots of *Castilla* seedlings in 42 days have grown to a length of 3 feet 4 inches in order to reach a water-supply, which by mechanical arrangement was gradually distanced from the roots in proportion to their growth. In the same time roots of *Castilla* seedlings in the undisturbed soil on Zacualpa did not reach a

greater length than 8 inches. A few years ago the land was covered with a layer of ashes through the eruption of a neighbouring volcano, Santa Maria, just across the Guatemala line. These ashes have formed a cover over the ground which materially assists in checking evaporation. The fertility of the soil is not unusually high, so that we may in time have to apply fertilizers. Experiments are now being conducted to ascertain the results of manuring this soil for rubber. The soil is rather poor in nitrogen and it has been found that the growing of leguminous plants between the rubber trees markedly influences the development of these.

If I add that the plantation is comparatively little exposed to high winds I have shown some of the reasons why I consider the natural conditions of this place nearly ideal for *Castilla* planting.

The method of planting first employed was to sow the seeds in nurseries, and when the seedlings were 4 to 6 months old they were transplanted. Very often, however, transplanting was not done before a year after sowing. The plants were then from five to twelve feet high. The seedlings were cut 5 or 6 inches below the surface, and topped, leaving a pole some 3 feet long. Tied into bundles, which were packed on mule back, these poles were carried to the field. With a pointed stake, holes were made in the ground about one foot deep, the pole placed in the hole and the soil pressed close to the stem. When this planting was done carefully and if rain fell within the next two or three days not more than 3 or 4 per cent. of failures occurred. In places where the soil was somewhat sandy the failures were more frequent. On Zacualpa as many as 18,000 trees have been planted per day in this manner. At first it was believed that shade was necessary, but it was soon noticed that this idea was erroneous and a system of planting in semi-shade was adopted. When clearing a certain amount of high forest trees were left standing, about four to the acre. It is now demonstrated, however, that even this amount of shade is too much on Zacualpa. On the other plantations, however, Juilapa and Zacualpa II, this semi-shade is beneficial as it assists the young plants through the dry season. These plantations are situated at a somewhat higher elevation, and the land is undulating and more drained.

Later experience has proved that the cheapest and surest method is to plant the seeds at stake. Nearly a year's growth is thus gained, and it does away with the expensive replanting where failures occur under the transplanting method. The seeds are planted in small hills, about seven seeds in each hill, three inches between the seeds. The hills are at a distance of about seven feet, in rows twelve feet apart. This method of planting appears at first sight decidedly wrong as the plants stand too close. A planter of Para rubber naturally thinks of the price of every seed be puts in the ground, but this is a minor consideration in the case of the small and rather cheap *Castilla* seeds. On Zacualpa we have the seeds for the picking, and any quantity of them.

In planting in the manner described we allow for a high percentage of failures in germination, we are prepared to give ants, lizards and field rats their due amount, and we still have plants in

abundance. This is no theory but has been practised for several years with success. There are no complete failures in any hill, except where planting has been done in ground which is too sour. In such places we may have too replant in small patches after proper draining has been prepared for, and in such cases we use excess plants growing in the neighbourhood. During the first few months seedlings backward, misshaped, or where crowding is observed, are cut out at the time of each weeding. Generally we cut at least 50 per cent. of all the seedlings during the first six months. Detailed rules have been worked out for this first thinning and they will be applied in the field by the assistants in charge. Great care is exercised in the selection of the plants allowed to remain, and many points have to be attended to. Thus if a plant branches in a way that does not promise regularity, or if it has grown twisted or bent it is cut out. In selection those plants that show a tapering shape with thick stem are preferred to plants growing mainly in height, and plants with large dark green leaves are preferred to those with small leaves of a lighter or yellowish colour.

Advantage of Close Planting.

One of the great advantages of this system of close planting and successive thinning is the opportunity for selection, a matter which is generally overlooked, but which, no doubt, will be found to be a most profitable policy. In *Castilla* cultivation we often get trees which produce very little or sometimes no rubber. It is evident that such trees are an unnecessary expense on the plantation. Why should we waste time on valueless trees? Can this in any way be avoided? With our present limited knowledge of the nature of the tree we cannot say with absolute certainty whether a seedling will become a good "milker" or not. But in the course of my physiological investigations of *Castilla*, I have already been able to draw some conclusions, which give us certain indications on which we can judge in this matter. That is to say, we can in some instances say definitely that a seedling, which shows certain characters, will never produce a large amount of latex. On the other hand, we cannot guarantee that a number of non-producing trees would not be passed during the selection time. But we have found a way to reduce their number, and I hope that further investigation will considerably improve the method. There is, however, another important point which can be applied in this process of selection. It is the choice of rapid growing, healthy plants of a certain desirable type. It is of the greatest value to the planter to have trees which are as rapid growing as possible. Now with the transplanting system a certain amount of selection can be done, but this is before the transplanting process, during which the plant is always more or less injured. There is no selection possible after the transplanting. With the "at stake" planting system mentioned we do our most important selection after sowing the seeds. I will presently refer to the selection which precedes the planting.

With the growth of the young rubber trees, successive thinnings become necessary to prevent crowding. It is here the men in charge of the plantation have to exercise their best judgment.

We fully realize the necessity of plenty of air and light for the growing tree. If this is neglected the whole system naturally is detrimental. But there is no reason why such an important matter should be overlooked. We have presupposed that we have to do with intelligent planters and superintendents, who realize that rubber growing on scientific and profitable commercial lines is a shade different from potato growing, as our forefathers practised this necessary and honourable industry a century ago.

On La Zacualpa we thin the rubber stand several times every year until the third year, when we have approximately 800 trees to the acre. During the fifth year we tap fifty per cent. of these trees, selecting the poorest and leaving the best trees untouched. We tap heavily, that is, extracting as much latex as is possible. A few weeks later the trees are inspected. Those that have suffered from the tapping are marked and doomed. If they still yield latex they are cut up with numerous incisions, and a few days afterwards the scrap is collected and the trees felled. Those trees that promise to recuperate are left untouched for four months, when they are again tapped in the regular way. After a second inspection they are killed. Exceptional trees which do not crowd upon the permanent trees may be left to the following, or sixth year, when they are tapped with an ultimate view to their destruction. At the end of the sixth year we have 400 trees to the acre.

Many objections have been raised against this method of close planting and successive thinnings. The main point in question seems to be whether the cutting out of a number of trees, leaving stumps with the roots in the ground, would not be preparing breeding places for fungous or interest diseases. I admit that there is some truth in this objection. In talking about rubber planting I am fully aware of the many dangers that may and most likely will arise from pests, animal or vegetable, in our *Castilla* or other rubber plantations. But in endeavouring to find preventives we must first of all be practical. Methods that are impossible to realize in practice are not worth mentioning.

If we are afraid of leaving the roots of rubber trees in the ground, why do we leave the roots and stumps of the jungle trees when we clear the virgin land for rubber planting? There are hard woods which do not decay for a long time, and during the first few years there is a constant decomposition going on, in the ground and above it, of roots, stumps, branches, and even trunks. Examination will disclose the fact that all of these are affected by some fungus or another, and overground parts also by insects. Do these present any danger to the planted trees? They certainly do, but as long as the planted trees are sound, they are not likely to be attacked, and there is hardly any other way of preventing disease than by keeping the trees in good condition. One of the main factors affecting the health of rubber trees is the drainage of the soil. Keep the ground well drained, and the trees will be sound.

It has been suggested that the ground should be stumped before planting, and others have advised digging up the roots after the rubber trees have been cut down. This is all very good, but if we have to stump the ground in preparing our land, I think

we had better give up rubber planting. At least as far as *Castilla* is concerned. To stump or dig up roots in an established stand of rubber is also a method not to be recommended, except in rare instances when absolute necessity arises, such as trenching for isolation of a tree affected by root fungus. The roots of the trees interlace, and any injury to these roots from wounding or bruising them is much more likely to permit an attack by fungus mycelia than leaving them undisturbed. In any case, the price of stumping would be prohibitive in Mexico and Central America.

It has been assumed that the tapping "to death" of alternate trees would be dangerous to the health of the stand. Why is tapping of alternate trees more dangerous than tapping every tree? As soon as all the rubber is extracted, that is in about a week's time, the trees are felled. In that time there has been no opportunity for any ravages of pests. There is a danger from intermediate or catch crops, such as cacao or coffee, and still they are recommended. How about the jungle belts that should be left at intervals in a rubber plantation? Do not these constitute a danger? Might they not become a breeding ground for pests? Of course, but we cannot eliminate all sources of danger, without making planting impossible.

There are essentially two ways in which we can start a rubber plantation. One is to treat it as an orchard. In this case we are restricted to a small area and we can naturally take better care of our plants, and probably obtain better results from our individual trees, but it costs more. The other method is planting rubber over large areas as we plant forests of other trees. Such plantations cannot receive the detailed care we can give an orchard, but it costs less in proportion to maintain. It is here we have to apply the methods of modern silviculture, and we must apply them in a scientific and at the same time practical and economic manner. As for the ultimate financial results they will be almost identical in either case, although as an investment the smaller place naturally presents a lesser element of risk.

Selection of Seeds.

We have noticed a decided increase in the rapidity of growth for every year since selection of seeds has been practised on La Zacualpa. This naturally stands to reason. Still the necessity for careful selection of seed for a rubber plantation does not seem to have been accorded the attention it requires. A farmer now-a-days is very particular about his seed corn, and a fruit grower thinks twice before he decides about the kind of tree he plants. Suppose a corn farmer sows seed that is very uneven in size, some fresh in the milky or green stage, others old and eaten by weevils. What kind of a crop will he get? When we want a hardy stock of fruit trees we take care to select only the best seeds. But a rubber planter seems to think that any seed is good, any tree is suitable as long as it is a *Castilla*. It must, however, be borne in mind that the whole life of the tree, its healthiness, size, strength, its amount of rubber, all depends upon the start it has. Unlike so many other agricultural industries, rubber culture cannot be immediately benefited by a lesson learned through bitter experience, because a tree, once

planted, will last for many years and has to flourish or fail according to its fitness. Mistakes cannot be corrected as easily as in corn growing, or cultivation of similar crops. It is clear that it will pay a planter to exercise care in the first instance, even more care than in the case of many other plants. This does not imply that a bad start is absolutely hopeless, but rather that care and discretion in the beginning will pay in the long run, and will save the planter many disappointments.

It is naturally difficult, well nigh impossible, to make any detailed selection of seeds, when a large planting, say of thousands of acres, is to be done in one season. But the planter can always subject his seeds to the ordinary methods of selection, such as mentioned below.

When commencing a plantation always get the seeds from planters who to your knowledge cultivate their trees and keep them clean. Naturally a tree that is well cared for will supply better seed than a neglected tree. Choose seeds from trees that look healthy, have straight tapering trunk, a full conical crown, and are known to give a large amount of latex and rubber.

Seeds from young trees, four to six years old, are larger and look better than those obtained from older trees. It is proved by experiments and experience that seeds from such young trees develop into a healthier plant than seeds from older trees. Whenever the tree is looking yellow or sickly, carefully avoid its seed. The large seeds are always better than the small ones. In regard to size the seeds should be selected by using a screen with meshes one-fourth inch in diameter. All seeds passing through should be discarded. The next step in selection of seed is to place them in a vessel of water, and separate all seeds that float, or do not sink rapidly, as these are defective.

Influence of Maturity of Seed.

If seeds are taken from fruits which are not mature and do not have the clear colour of the flesh they will most likely either fail to germinate, or produce inferior seedlings. Experience has shown in regard to most cultivated plants that the maturity of the seed has a considerable influence on the offspring. Immature seeds lessen the vitality of the subsequent seedling and tree.

I have noticed that seeds from young plants are fuller and more rounded than those from older trees. The seedling from such a seed has smoother and bigger leaves than those developing from seeds with a loose seed coat and ribs on its surface.

The root development is much stronger in a seedling from seed taken from younger trees, and this is another reason why careful attention should be paid to the age of the parent tree.

There can be no doubt but that planters who are careless and do not select their seed, make a grave error which they will find out to their regret. Thousands of dollars have been wasted by ignorance or neglect in this respect. If a mistake is made in selecting or non-selecting of seeds it will not be realised before the lapse of at least a number of years, when it probably will be impossible to correct the blunder, and make the plantation as productive as it otherwise would have been.

Methods of Selection.

The process of selection should commence, as I have pointed out above, with the seeds. Whatever method of planting is adopted the most important time for selection is when the seedling has appeared and grown to a size which permits the distinguishing of its main features. In order to be able to exercise necessary judgment in this selection the planter should be thoroughly acquainted with the development of the plant in its various stages.

I have previously stated that a great variation exists between individual plants. This variability is evidenced in a large proportion of the trees producing a small quantity only and often an inferior quality of latex. Such a lack of uniformity necessitates a subsequent sorting and grading of the latex if a good result is to be obtained. If latex from all kinds of trees is indiscriminately mixed together the result will be a lowering of the standard. From a planter's view-point uniformity of stand is desired, and to attain such a result systematic seedling selection is a necessity.

It has been demonstrated by recent experiments that it is possible to secure by selection a great improvement in the uniformity of the rubber stand. It is equally possible to obtain a considerable increase in yield, and the planter should give the closest attention to these and other points which can be controlled by careful selection. The planter should first decide upon the type of tree he desires and when he has formed a clear conception of this in his mind he should go through the rubber forest, carefully observing the trees and selecting the number of trees he needs for the production of his seeds. When these seeds have been collected and treated in the best possible way, they should be further selected by the screen and the common specific gravity methods. When such seeds have germinated the resulting seedlings will clearly demonstrate the benefit of seed selection. As soon as the young plants have reached a height of 7 to 8 inches it is time for the planter to pass through his fields, eliminating all plants that are defective, backward, or in any other way undesirable.

Increased Size and Productiveness.

Only a superficial observation is necessary to show the planter that when a rubber tree is cultivated properly it re-acts to good treatment. If the trees have good soil with sufficient moisture, plenty of light and air, and no crowding or competition with other plants of its own or any other kind, it will grow quicker, remain healthier and more robust, and what is most important, it will furnish a greater surface for tapping, than if exposed to the vicissitudes of the natural struggle for life in the forest or in a plantation where the trees stand too close.

If we subject the trees to the best possible treatment according to modern and improved methods of silviculture we will soon be repaid for the additional care bestowed upon the plants. There can be no doubt but that the size of the trunk can be considerably increased by breeding and selection. There can be as little uncertainty in regard to the possibility of increasing the amount of

latex in the tree. These improvements take, however, some time, and the rubber planter of to-day cannot immediately benefit by the gradual advances made in this connection. To him it is more important to take advantage of methods of selection which can be put into practice on his plantation already started. On such a place it is of the greatest consequence that all unproductive, sickly, or otherwise unsatisfactory trees be destroyed. It does not pay to cultivate trees which do not give a payable quantity of latex, and it is a waste of land to keep the ground occupied by such trees, which should be immediately replaced.

In regard to the rapidity of growth and the size of the seedling and the subsequent tree, it has long been conclusively proved that the heavier seeds are far superior to the light ones. Experiments conducted with a view of determining whether the size of the seeds have any effect on the vigour of the plant, have shown that plants grown from the heaviest seeds attain a greater size even if they do not always germinate as rapidly as the smaller. It has further been demonstrated that plants grown from the heaviest seeds have a greater power of resistance to drought.

To insure a good stand and a greater yield, none but the largest and heaviest seeds should be selected, and of the seedlings the most rapid grower, with the healthiest and most vigourous appearance.

Experiments in Improving Castilla.

So far, very few experiments have been made for the purpose of improving the *Castilla* rubber tree, or in order to ascertain the growth of the seedling under different circumstances. A series of such experiments were started in April and May of 1906, at La Zacualpa Botanical Station in Mexico. The results of these initial experiments are not yet available for publication, but I have found that so far a marked improvement is noticeable in seedlings placed under favourable conditions and subjected to rational and systematic treatment.

Habits of Castilla.

When we study the *Castilla* in its native conditions, in the natural surroundings in which the tree has been able to exist and flourish in competition with other trees, we learn many a useful lesson as to its requirements under cultivation. It is by no means essential that a cultivated plant should always have to be grown under conditions identical to those of its original habitat, but we can always derive pointers from a close observation of nature.

One of the first things we notice when observing *Castilla* in the wild state is that it prefers small openings in the forest and that it never selects very heavy shade. In this regard, it is similar to its relative the Guarumbo tree which is always found in localities where the primeval forest has been cleared at some time or another. The Guarumbo, or trumpet tree (*Cecropia*), is very common through Southern Mexico and Central America. It is often called the false rubber tree, because to the unitiated newcomer it resembles at a distance *Castilla*. As soon as a clearing is made *Cecropia* will gain

a foothold and as it is of very rapid growth, it soon grows into a small tree. I have noticed on some plantations that the managers studiously avoid cutting down the Guarumbo trees wherever they grow among the rubber. I was informed that this was done on purpose as the Guarumbo tree resembled the rubber tree so much that it helped to carry out the impression of an even and good stand of rubber trees. Inspecting shareholders did not notice the difference. I am ready to believe this, as there appears no other reason why the Guarumbo tree should be left standing. It is not good as a shade tree and as it consumes a great amount of water and plant food, it is decidedly detrimental in a rubber stand.

In the natural succession of the forest trees both *Cecropia* and *Castilla* are secondary elements. The seed of *Castilla* is so thin shelled and perishable that it needs a moist place in which to germinate as it would otherwise be destroyed by the heat of the sun. We therefore always find the young seedlings growing close to other trees which give them sufficient protection.

Castilla depends in many other respects upon its neighbours for safety. It is a very brittle tree, easily broken by the wind and therefore needs a wind-break. We always find *Castillas* in the pole stage standing close to other trees, which indicates that they have been able to survive only by reason of the protection afforded by the other trees. It may be inferred that if this is true we would never find a *Castilla* standing separated from any neighbours. I think that in every case where an old *Castilla* tree is found single it has either been planted by man and protected, or, if a wild tree the surrounding trees have been destroyed in some way or another. It is at least on very rare occasions that *Castilla* is able to live through the sapling and pole stages without protection against wind.

Another way in which *Castilla* gets protection from neighbouring trees is that these give shelter to the ground, retain moisture, and prevent the soil from cracking. Castilla is very sensitive to these influences, as its roots do not develop properly in hard-baked ground.

Castilla does not, on the other hand, develop well in shade. It grows very slender, with a weak trunk and an undeveloped crown. The tree needs plenty of light for its foliage and it is only where the *Castilla* tree has room enough to spread its branches and expose its foliage to the rays of the sun that it can successfully maintain its position in the struggle for space and light.

In districts were a distinct dry season prevails, *Castilla* is pronouncedly deciduous and drops its leaves at that period of the year, while in a humid region the shedding of leaves goes on all the year round. On the Pacific side of Sierra Madre in Mexico, the dry season lasts from January to May, and the rubber tree begins to shed its leaves with the advent of this season, and towards its close the trees are almost destitute of foliage.

It is generally stated that *Castilla* does not flower and set fruit before it has reached an age of about five years. Another statement is that flowering commences when the tree begins to develop permanent branches. My observations show that if *Castilla* is grown on good soil in a suitable climate, and if the

development has been normal, the tree will flower in its third year, whether it has permanent branches or not. I have seen many two years old trees with flowers and fruit, but I would consider this premature, and indicating that something is wrong with the tree.

The season of flowering is from February to the beginning of May in the Zacualpa district in Mexico, and in Western Guatemala. The earliest fruits begin to ripen in May and ripe seeds can be had until August.

The flowers are unisexual, but both sexes occur on the same tree. I have often heard it stated by planters and others, that there are two distinct trees, the male and female. It is also said, and generally believed, that the "male trees" do not produce latex as well as the "female." In my experience all the older trees carry both male or staminate and female or pistillate flowers. While the trees are young they often have only staminate flowers but after reaching a more mature age both sexes are present. I think we can safely abandon the idea that some trees are male and therefore no "milkers," while others are female and good milk producers. Such an analogy is rather far fetched and has a strong flavour of ignorance.

I have found trees on which the female flowers have been sterile on account of insufficient development of the ovary. Such trees naturally do not produce fruit. Whether there are any permanently sterile trees is a question yet to be investigated. I have seen numerous instances where a tree had no flowers one year but developed a profusion of both staminate and pistillate flowers the next year. I have also noticed cases where a tree had an abundance of fruit one year and none the following. Whether there is any regularity in this development of flowers and fruits I am not in a position to say at present.

The idea that a sterile tree, or at least a tree not carrying fruit, produces less latex than a fruiting one is erroneous. I have noticed instances of trees with plenty of fruit giving little or no latex, and again of non-fruiting trees with an abundance of latex. It seems though as if a tree generally yielded more latex while in fruit than during any other time of the year.

The staminate flowers consist of imbricated scaly flat pods, which open along the edge like a clam shell, with clusters of yellowish stamens on the inner side. These pods or heads are up to one inch long, as a rule, but another kind of smaller staminate flowers are found immediately below a cluster of pistillate flowers. The stamens in these semi-spherical heads often have pollen grains which are shrivelled up and apparently sterile.

The female flowers have numerous ovaries on a common disc-like receptacle or cup, covered with scales larger than those of the staminate flowers. Each pistil carries two straight, scarred, two-parted styles.

The fruit is first green, and when ripening gradually turns a deep red, finally fading into an orange colour. From eight to thirty fruits mature in each cluster, and a much larger number

never develop but remain in the form of larger or smaller scales. At the apex of every fruit is a small hollow in which the dried up remnants of the style can be seen.

The Best Type of a Castilla Tree.

We have yet to ascertain the cause of the difference in yield of individual trees, or at least, we must find out what trees are the best producers and the most rapid growers, before we can enter upon the problem of determining or developing the best type for a rubber tree. On general principles we should require a tall, straight trunk, with a dense crown at the top of the tree. But the natives hold that a tree which is not too tall and which has a tapering trunk, gives a larger yield and better rubber than a taller tree of the same age and with the same girth at the base. I have been able to verify this by actual experience, but I cannot give any explanation of this fact.

The object is to develop a trunk with as large an area as possible for tapping. Branches seldom attain a tapable size and a rubber stand with clean stems, without intertwining branches or underbrush, is easier to work in than in a tangled mass of trees growing without order and care.

We have many instances of large trees with tapable branches, or trees which have branched from the base, being regularly tapped and producing a quantity of latex. It may seem an advantage to have several stems to tap instead of only one, where a single shoot or a single trunk has developed, but there can be no question as to the fact that where several branches are allowed to develop the growth of the main trunk is greatly retarded.

It is therefore necessary to have a tree straight and clean boled, in a condition to make the best of the period of maximum growth, the time of which has not yet been ascertained. We know for a fact that the best rubber producer has a thick, compact crown. The conical form of crown is also to be recommended as it naturally receives more light than a flat crown. After the *Castilla* growing in the wild state has obtained its maximum height the crown always becomes flat and rather ovate in shape, while in youth, when the tree is growing vigorously under normal conditions, it has a sharply conical crown. Every kind of tree has a maximum height to which it is able to pump water, and when this height has been reached the growth of the tree ceases because the crown cannot be supplied with sufficient water. The normal rubber tree should not, therefore, be very tall as in the best situations the wild tree reaches a height of about sixty feet, and the over-mature trees always have a very spreading crown. Sometimes dry topped young trees are observed. This is due to unsuitable conditions in some respect or another, and we recognize this as a disease, called by foresters the "staghorn disease."

The leaves should be large, with a fresh green colour, the bark thin and smooth. Some trees have leaves with stiff, bristly hairs, and I have found on some plantations almost every tree covered with these stiff hairs, sometimes resembling prickles. In cases where

such hairs occur the trees were below the average in regard to yielding capacity. It seems therefore obvious that hairs should be absent in the future type of rubber trees. There is also another reason for this. We know that the hairs are one mode of protecting the leaves against excessive transpiration. The latex is another means by which the tree prevents its water supply from evaporating too rapidly through the leaves. If we develop a tree without hairs we should be able to force the tree into preparing more latex in order to keep up the equilibrium, not allowing too much water to transpire.

Remarks on Function of Latex.

By the above I do not mean to say or indicate that I consider the function of latex as solely one of water storage or prevention of too rapid evaporation. But field observations as well as laboratory and breeding experiments have conclusively shown that the protection of the plant against too rapid transpiration is one of the functions of latex, at least in *Castilla*.

I could give a number of proofs for this, but as the question is more fully discussed in my Handbook on *Castilla*, above referred to, I will here mention only one instance, which first fell under my observation in July 1905. In walking through a stand of four year old rubber trees, one early morning, I stopped and measured some two dozen trees, which were especially well developed. I noted down in my field-book certain characteristics of these trees, and with my thermometers, took the soil and atmospheric temperatures, near one of the trees standing about in the middle of the group of trees measured. I intended to return two hours later, when the full heat of the sun had been acting on the trees to re-measure the trunks in order to find out the shrinkage of the trunks at different times of the day. I was delayed, and returned some four hours later instead, at 10-47 a.m. The first thing I noticed was that one of the trees which in no way differed from its neighbours upon my first visit, was now looking very exhausted, with drooping branches and leaves hanging limply downwards. Another tree standing by looked perfectly fresh, while some of the others showed signs of having been slightly affected by the now scorching rays of the sun. This difference in power of withstanding sudden high temperature was so marked that I decided to try the different trees for latex. The result of a small cut in each tree was that *A*, the tree with drooping leaves, had no latex, while *H*, the most fresh looking tree of the lot, had plenty. Between these *B*, *C*, etc., showed a gradual increase in the amount of latex with the exception of two trees *F* and *G*, of which the latter had less latex than the former, but it was much thicker. This year I noticed the same difference at the end of January. Closer observation now revealed the fact that *A* had much more hairs on the leaves, petioles, and branchlets than *H*, and thus ought to have been better protected against too rapid transpiration. Counting the stomata on the leaves, I found that the number was smaller in *A*,—another protective device. The barkpores were almost equal. Five weeks later *A* commenced to drop its leaves, and was almost bare at the end of March, when *H* still had all its foliage left. *A* did not

commence to drop leaves before the last week of April, and did not loose many before the rainy season set in, and new leaves were again developed. *A* recovered rapidly in June, after the rains began, and was soon clothed in full foliage. In January, *A* had a small amount of latex, and whenever cut during the dry season a few drops appeared in the wound. After a few weeks of rain no latex appeared from an incision, i.e., the tree behaved exactly as it had done in the rainy season of the previous year. *H* had an abundant supply of latex in the wet season, and in the dry part of the year this latex was still present, but was less watery, or more concentrated.

How are we to explain this fact that a tree, such as *H* in the above experiments, with less of ordinary protective devices, but more latex was better able to stand excessive transpiration than *A*, with rather well-developed protective arrangements, but only little or no latex? I think the only answer is to be looked for in the presence or absence of latex in respective trees. Both were vigourously growing trees, and *A* did not seem to be much handicapped by the absence of latex, except in regard to transpiration. When having the advantage of a humid atmosphere and plenty of water after the beginning of the rains, the tree grew as well, and almost better than the others. It is also worth noticing that in the dry season a small amount of latex appeared. It was all the tree was able to produce for its protection against rapid transpiration, and by means of this and an early leaf-fall it could survive the vicissitudes of the drought.

I will also briefly relate one of my laboratory experiments, which has a bearing on this matter. Two *Castilla* seedlings were grown in pots, and when they were four inches high one was placed under a double glass bell, the outer room of this filled with an orange-coloured liquid to give the desired light, and the inner bell constantly filled with well saturated air. The other seedling was placed in a bottomless glass cylinder, and by means of a fan, kept going by a clock movement, a constant exchange of air was secured in the cylinder. This was further placed so that it was exposed to the sun all day long. The roots received all the water they could absorb, and thus the transpiration was kept at a maximum. First the latter plant was very weak, but gradually recovered strength. After three weeks both plants were examined, both micro- and macroscopically as to latex. The plant in the moist air had well developed latex vessels, but the liquid in these was thin, and without any formation of globules. The plant which had been exposed to excessive transpiration had the ordinary latex of young seedlings, but rather concentrated. To make sure that this result was not merely caused by an individual or inherent character of the seedlings employed, I renewed the experiment, taking care to select seedlings which did not appreciably differ in any respect. The result was again the same.

I consider that this shows that when *Castilla* is grown under certain conditions the quantity of latex produced in the tree is reduced to a minimum, while under conditions favourable to or assisting excessive transpiration *Castilla* will produce latex *as a means of protection.*

How are we to explain the fact that *Castilla* in some places in the mountains of Southern Mexico, where the rainfall is high and the atmosphere laden with moisture, does not produce latex, or at least a very small quantity? I take it to signify that in those places the transpiration is less than on the plains. This is, of course, only assumption, and the question is still open.

It has been claimed by certain theorists that the sole or at least the principal function of latex is protection against the natural enemies of the plants. How is it then that those individual trees of the same species, which do not produce latex, are not instantly devoured by insects and other pests? Let those who know answer this. I think that the conclusion of latex being solely a protection against insects or other animals is as narrow as the theory that spines are developed on certain plants for the same purpose, solely for the protection against animals. No plant physiologist or ecologist who has studied the question in nature would now-a-days maintain this. I do not deny that latex in the rubber trees may *incidentally* be a means of protection also against insects, but this certainly is not its main function.

Tapping Operations on La Zacualpa.

There has been a great difference of opinions as to the age at which a *Castilla* tree can be tapped. We have, however, to go more by size than by age. In one district the average tree may reach a tapable size when 6 years old, in other places not before 10 years of age. A definite rule can therefore hardly be laid down. The term of 6 years was tentatively put forth by most planters in the early days of planting, that is 5 to 10 years ago. Now I would say that the gathering of rubber from trees less than 8 years old is not likely to be advantageous. On Zacualpa we tap in the 7th year all trees with a girth of 28 inches at three feet from the base. Such a tree takes four incisions, nine inches long. In the 8th year we expect to tap all trees down to 25 inches, and this minimum girth for a tapable tree will then be maintained. After the 8th year the greater number are probably ready for tapping. One incision drains a larger area on the stem than in *Hevea*.

It is well known that rubber from three to four year old trees is decidedly inferior. Consequently we cannot go by size alone when we speak of young trees. The size has, however, more to do with the productiveness than the age. But we must take the "maturity" of the latex into consideration.

In order to keep track of all work performed on the plantation a series of observations are to be made by the assistants, and the data thus obtained will serve as a guide in laying out our tapping plans. As I have already mentioned the plantation on La Zacualpa is laid out in square blocks. All records in connection with each separate block are filed on cards, such as are now common in most American business houses. The blanks are printed ready and the cards appear something like the following figure, when completed with notes:—

		Harrison *Avenue.*		
Block No. 76. *Planted* June 25th 1905. *Last Weeding.* Dec. 19th 1905. *To-day's work.* Weeding, 5 men.	22nd *Street.*	Weeding finished. Drain. 2 trees dropped. Somewhat crowded. White ant nest destroyed to-day with carb. dis. Stand is now perfect. 5 trees slightly injured by wind. Branches need chopping.	23rd *Street.*	*Notes by* F. Marx. February 2nd 1906. *Remarks.* Main drain corn. Harr. & 22nd needs immediate attention. Wind of January 27th did slight damage
		Butler *Avenue.*		

Each assistant will be supplied with a note-book, the pages of which are ruled in the above manner, and he is expected to make field-notes of any observations made during work or while riding over the estate. The notes are written on the card in a position indicating the place in the block, so that the men in the office are able to direct a foreman to attend to any small matter needing adjustment. From these cards maps can be drawn showing the exact condition of the plantation at any special time.

These notes are handed to the superintendent at the end of the day's work and then copied on permanent cards which are filed in drawers in special cabinets. In this manner a large amount of detail is always ready for reference, and the history of any particular block can be learnt in a few minutes time. With this system we will not be much handicapped through changes in the staff, as a new assistant with ordinary intelligence can grasp the details of the plantation in a few days. Similar notes are to be kept of tapping and all other operations in the field.

We have fully realized the necessity of training our tappers, and we expect an ordinary tapper to cut 1,000 incisions per day, that is to say, tap 250 trees with four incisions, up to one foot long. Tapping should be done between 5 and 11 a.m. Evening tappings will not be practised as the distances are too great, and it would not pay to have the men walk several miles to tap probably one hour in the evening. Moreover, in our rainy season it almost invariably rains in the afternoon, and tapping must cease during a heavy rain to prevent loss of latex from washing.

The problem that faces us within a few years on La Zacualpa is to tap over two million rubber trees. We know that we have to tap these twice in the six months season available. A simple mathematical calculation shows the amount of labour necessary, as well as the great importance of our developing as economic and labour saving methods as possible. Fortunately rubber is a crop

which will stand more expensive labour than almost any other tropical product, even if we had a drop of over 50 per cent. in the present market prices.

In tapping a *Castilla* tree all the latex exudes from the wound in a time varying from 20 minutes to two hours. After that time very little latex appears. Two days after tapping all wounds are inspected and cleaned of scrap. If an incision has been too deep, penetrating into the wood, the wound is disinfected by the scrap collector, who for that purpose carries a brush and a can with a mixture, the application of which prevents fungi from getting a foothold. A normal wound, where the wood is still covered by cambium, heals quickly and is not, as a rule, attacked by borers or fungi.

The amount of latex obtained from a single tapping is so large that on old trees quite good-sized cups are needed. The system of pushing the edge of the cup under the bark is not suitable on *Castilla*, as latex will run to waste from the wound made, and the hold of the bark on the rather large cups is not sufficient. They sometimes drop, and this must be prevented. Driving nails into the trunk results in bad cankerous wounds, and with the system of tapping employed the number of nails on each trunk would soon be considerable. The cup is made with one side slightly curved inwards to suit the trunk approximately, and from one side of the edge of the cup a string is led round the trunk, and with a hook fastened to the other side of the cup. The placing of a cup on the trunk is done with less manipulation than is needed to press the edge under the bark or driving in a nail and hanging a cup on this.

The latex is emptied from the cups into small galvanized cans holding 2½ gallons each. These are carried to the nearest collecting depôt, never more than 600 yards away, where the latex is weighed and collected into big cans, somewhat like the large milk cans used in dairies. From here the latex cans are transported on wagons to the rubber factory. All cans and cups are rinsed with clean water at the depôts, and at the end of the day's work placed in a small shed, erected at each depôt. Here are kept all the tools needed, in order to save the transportation back and forth every day to head-quarters. As the latex from young trees is very apt to coagulate before reaching the factory, a small amount of formaldehyde is added to each can by the foreman in charge of the depôt, where collection has been made. One depôt is the central station for each series of four blocks, and thus the depôts are placed at every second crossing along alternate avenues. Communication between the depôts is made easy and one assistant is able to supervise the work at a larger number of depôts, than if they were scattered about the plantation. In the office every depôt is known by a number, marked on the map, and during tapping control can easily be kept of the returns from each depôt.

The rubber plantation will further be divided into four fire districts, each with a patrolling watchman, who by easily accessible field telephones can quickly report to head-quarters when necessary. The labourers are at present divided into two camps, one at the "finca" as the buildings of an estate are called in Mexico, the

other some $3\frac{1}{2}$ miles distant, in the middle of the rubber plantation. In the future an electric tram system will be laid out to facilitate transportation on the estate. The new Pan-American railroad passes within a few miles of the plantation buildings, and La Zacualpa station will mark the place of communication with the outer world.

The Preparation of Rubber.

At present the rubber factory is in temporary quarters under the roof of the estate saw-mill. A proper factory building will be erected next year. Briefly stated, the system of preparing rubber, which will then be adopted, is as follows:—The latex brought in from the field is emptied into a collecting tank, where an equal amount of water is added. Inside this tank is an endless screw which slowly revolves and thus mixes the latex and the water without causing a separation of the natural clumps of globules. In case the preparation has to be postponed, a small amount of dilute formalin is slowly added from an automatic drip can. From the collecting tank the latex passes through a strainer into a stirring vat, where more water is added and the mixture is well stirred; the temperature being slightly raised with steam passing through pipe coils inside the vat.

If we adopt a smoking or fumigating process, which is not yet definitely decided, the latex would next pass into a zinc cylinder and through a series of sieves between which the fumes are pressed. The thoroughly fumigated latex falls into a vessel, whence it is run off, fifteen minutes later, into settling tanks. Here the creaming of the latex takes place, and by very gentle stirring of the top layer of "cream" coagulation is assisted. Sometimes a coagulant has to be added, but more often the latex shows a tendency to coagulate too rapidly. From time to time some of the mother liquid, which is dark brown, resembling beer, is drawn off from below and clean water is slowly added.

The coagulated rubber slabs are passed on to the washing machine, and after a thorough washing, the rubber is dried *in vacuo.*

It is very difficult, even by adding coagulants, to effect the coagulation of all the rubber in the latex. As an adjunct to the creaming process all of the remaining latex, after two creamings, is passed through a centrifugal separator, and after this the mother liquid does not contain any more rubber.

All the rubber is pressed into blocks in a strong screw press after drying. Two years ago Mr. Harrison prepared with tartaric acid on La Zacualpa a big rubber block as an experiment, and it proved to be the most attractive and practical way in which we can ship the clean plantation *Castilla.* I have received the advice from English rubber brokers to send *Castilla* rubber as crepe, but I greatly doubt the advisability of this, as the oxidation would be considerable, and *Castilla* suffers more from this than Para rubber.

Sulphurizing the Latex.

The addition of finely pulverized sulphur by a process corresponding to the vulcanization suggested itself, in the early stages of my experiments with *Castilla* latex in the laboratory at La

Zacualpa. This sulphurizing the latex is, of course, easily feasible, but beyond its preserving action on the crude rubber there is very little to recommend it to the planter. From the manufacturer's point of view, however, a very strong objection will be raised, and it seems to me this cannot be overlooked. In whatever way we add solid sulphur to the latex, the quantity will vary on different plantations and no uniformity can be achieved. This method further lends itself to adulteration, which the rubber buyers always seem to be afraid of. It would in every case be necessary for the manufacturer to analyse his crude rubber for sulphur, and in most instances he would have to desulphurize the rubber before vulcanizing. As the rubber must be masticated before it is mixed with the various ingredients necessary in manufacturing different articles, there is nothing to be gained in the way of preserving the "nerve" of the rubber.

I mentioned above the disinfecting and preserving action sulphur would have on the crude rubber. My series of experiments on sulphurizing latex and preparing rubber from thus treated material consisted of 63 different experiments, each varying from the others in some more or less important respect. I made good samples of rubber, and bad ones, from the sulphurized latex. In most cases there was no development of bacteria in the rubber, even though the samples of rubber were exposed in the culture jars to an atmosphere full of spores of moulds and decaying latex was poured over the rubber. Inoculation of bacteria cultures made of different forms occurring in "tacky" rubber was tried, but failed to develop on samples where a thorough admixture of latex and sulphur has been accomplished. The preserving power of sulphur mixed into the latex seems undoubted.

I have tried many various methods of smoking the *Castilla* rubber and of coagulating by means of smoke. The most successful one is, I believe, the following. The fumes of burning sulphur were pressed into the latex for varying periods, and it was found that this assisted considerably the coagulation. I then mixed fumes of burning sulphur with the smoke of creosoted wood, pressed this mixture through a cooling apparatus to slightly bring down the temperature, and thoroughly fumigated the latex. This coagulated quickly and gave a grayish rubber, perfectly transparent, with a high degree of tensile strength. It has not deteriorated in the six months that have passed since the experiment was made. Whether this method will be incorporated in the manufacturing process on La Zacualpa depends on further experiments. The present results indicate that there is a possibility in this direction.

Rubber Experiments.

Before ending this brief description of conditions on La Zacualpa, I wish to mention a few words about the experiments which are being conducted at La Zacualpa Botanical Station and Rubber Laboratory. This institution began its work on December 1st, 1905. Its purpose is the scientific investigation of the various problems connected with rubber culture. In the short time of its existence the station has not been able to accomplish very much

besides laying the foundation to a systematized study of *Castilla* and *Manihot* rubbers. Considerable time was taken up in organizing the work, and in equipping and arranging the laboratories. These consist of a chemical laboratory, fully equipped with all necessary apparatus and re-agents for analytic and experimental work; a plant physiological laboratory supplied with ordinary instruments and microscopes; a bacteriological department with all the paraphernalia pertaining thereto, incubators, sterilizers, microtomes and microscopes; a rubber experiment department with various appliances; a shop for making models and repairing instruments; a library with reference books, literature on chemistry, tropical agriculture, entomology, botany, coffee, and rubber, about forty periodicals, and some 4,000 pamphlets on agricultural and related subjects.

Our first work was to take a survey of conditions on the rubber plantation. Detailed observations were made of the rubber over the entire estate. These data were copied on cards such as intimated above. Maps were made showing the condition of the rubber on different areas and from different points of view. Suggestions were made as to treatment of the rubber stand. A drainage system was partly worked out. 30,000 trees were measured to ascertain the average girth and height of trees of various ages. Observations on branching, leaf-formation, root-development and light requirements were made. A complete working plan for 30 years was formulated and submitted to the managing director. Insect and fungus diseases were studied and remedies tried. Means for preventing forest fires in the rubber were suggested.

A number of well-developed young rubber trees were selected in the field and transplanted to the experimental grounds, which had been opened. Here seeds of different *Castilla* varieties have been sown. Ceara and other rubber producing trees and vines have been planted. It is intended to get a complete collection of the world's rubber and gutta percha plants. *Castilla* seeds have been sown under varying conditions of soil to ascertain the difference in development. Manuring experiments have been commenced. Influence of catch crops is being studied. Observations are made as to the best method of weeding, and the result of this as shown in the progress of the rubber trees. Pruning and transplanting experiments are going on, as well as experiments in grafting and hybridizing.

In the course of the plant physiological work experiments on transpiration have been commenced; the temperature of the tree and of the latex in the tree is ascertained under different weather conditions; the effect of wounding is studied; root and bark pressure is experimented upon; relation of leaf-fall to latex is one subject of investigation; several other lines of inquiry have been entered upon, and numerous new problems will be studied in the future.

The bacteriology of latex and crude rubber is not entirely unknown, and we have ascertained some very interesting facts. Before these are published, however, the flora of the crude rubber

is being classified by a specialist and the enzymes are carefully investigated. We have tried over one hundred different chemicals in regard to their disinfecting power, and we have no difficulty in preserving the latex for a considerable time. By the addition of formalin to the latex it can be kept for at least 27 months without changing its character. This is the oldest latex I have had to deal with, but I am inclined to believe that the latex can be kept indefinitely. I have deposited in La Zacualpa laboratory samples of latex, which are now 11 months old, and I put up a sample with formalin in June 1905, brought it to Stanford University in California, where I last saw it in September 1906, apparently in the same condition. The 27 months old sample above referred to was given me by a Mexican rubber planter, and I made from it a sample of rubber, which in no way differs from that coagulated from fresh latex. Salicylic acid in small quantities has proved to be a good disinfectant of the latex, but I do not know how it would effect vulcanization. Creosote coating and other methods of mixing creosote into the latex and rubber have been tried.

A suitable hydrometer for measuring the density of latex has been devised and is used with success.

Analyses of rubber soils have been made, and one series of analyses of special interest is that of the soil on Zacualpa down to a depth of 20 feet. Numerous analyses of latex of *Castilla* and *Manihot* have been made, as well as of crude rubbers. The chemical constituents, especially the resins, in latex from trees of different ages are being compared and studied.

Soil temperatures on the rubber plantation are taken at regular intervals and comparative studies made of these with the tree temperatures, and the ordinary meteorological observations taken daily as to temperature, wind, light, humidity, atmospheric pressure, evaporation, serve as a basis for all our studies of the ecology of *Castilla*.

One of the assistants made a four weeks' journey of inspection to the Isthmus and Trinidad River rubber districts in May, and the director of the station was dispatched, in September, on a voyage round the world in order to study conditions of rubber cultivation in various tropical countries as well as market conditions in Europe and America.

The station has been fortunate in having the confidence and unlimited support of the managing director of the company, Mr. O. H. Harrison, who is ready to listen to and accept all suggestions based on actual scientific observation and conforming to sound business principles. Many Mexican planters have recognized the work on Zacualpa, and among others the President of the Republic follows the station with the closest interest. We are often asked questions in regard to rubber culture, but as the institution is a private one, we have not been able to devote time to giving directions to outsiders. A series of bulletins will, however, be published, giving the most important results of our work. Three of these bulletins are in press, but will not appear in print, before the return of the director to Mexico.

Ceara Rubber in Mexico.

The only attempt to cultivate Ceara in Mexico was made a few years ago by Mr. O. H. Harrison on his Esmeralda coffee plantation, some 12 miles from La Zacualpa, at an elevation of 2,000 feet, on the slope of Sierra Madre.

Mr. Harrison had considerable experience of rubber in Brazil, and it struck him that Ceara rubber would be a suitable crop on the highlands of Chiapas. Seeds were procured from Brazil and planted on Esmeralda. The plants were left almost entirely to their own device receiving very little care beyond a few sporadic weedings. Compared to other Ceara trees I have seen they have not developed very well, but the amount of latex is satisfactory. Tapping experiments will be conducted regularly on these trees, a few hundred in number.

Guayule Rubber.

The invention of a practical method of extracting the rubber from the Guayule plant of Northern Mexico has lead to over-sanguine estimates of results from this new rubber industry. Factories are being erected in numerous places, and the periodic press reports the floating of one big company after another for the purpose of exploiting the Guayule covered plains of the north of Mexico, and of certain districts in the southern part of the United States.

In considering the development of the *Castilla* rubber industry of Central America it is necessary to pay some attention to the reports on the Guayule product, especially because it has been maintained by some promoters interested in the question that the Guayule would supersede the production of all the other rubbers, that the Guayule would lower the prices in the world's market to such an extent as to render cultivation of *Castilla* and *Hevea* an impossibility, and that the Guayule would supply the entire demand of the world for crude rubber. I shall here briefly discuss the question.

The much advertised Guayule rubber is obtained from *Parthenium argentatum* A. Gray, a shrubby plant belonging to the family *Compositae*. This plant occurs in the bush prairie formations of the northern part of the Mexican highlands, or more specifically, in the northern districts of the states of San Luis Potosi and Zacatecas, in Chihuahua, in the eastern part of Durango, and in the southern districts of Coahuila. In the United States the plant occurs in Texas, New Mexico and Arizona, in limited areas.

The supply of Guayule has been greatly over-estimated, principally because of the confusing of Guayule with another species of the same genus, *Parthenium incanum* H. B. K., which is far more abundant and grows all through the Guayule territory. This has been estimated to as much as 28,000 square miles, but it must be remembered that the patches of Guayule are far apart and one can travel over miles in the Guayule country without seeing a single specimen. The general estimates of Guayule on the acre is from

400 to 700 pounds, taking an average for large areas. This is undoubtedly too high an average. By actual count in very favourable localities I have become convinced that even under the best conditions not more than 1,500 pounds can be obtained per acre from the Guayule patches, and these constitute less than one-tenth of the total area of the territory, where the plant occurs. That my estimation in this regard is upheld by others who have investigated the matter and expressed an unbiased opinion is shown by the following lines, translated from an article by Dr. R. ENDLICH, in "Der Tropenpflanzer." The author says in part:—

"The supply of the Guayule is very unevenly distributed in the territory the plant occupies. In most places the plants are isolated, growing sometimes in large and often in small numbers among the other plants. At rare intervals small patches are found where it is predominating in the chaparral flora."

"It is very difficult to make an estimate of the average supply per hectare, both on account of the uneven distribution of the plant and because of the difference in size of individual specimens. In favourable territory I have on several occasions counted thirty to forty plants on an area of 100 square meters, which would mean a total supply of 3,000 to 4,000 Guayule plants per hectare (=1,215 per acre). The differences in size and weight are so great that in places where the plants are small and grow close together ten plants have a weight of only one kilogram (=2 1/5 lbs.), while in the best territories some of the trees weigh as much as 3 kilograms each. The average weight will probably not exceed 500 grams (1 1/10 lb.) per plant."

"Estimates of the Guayule supply in large areas vary from 500 to 800 kilograms per hectare, but the distance between the different places where the plants are found is often considerable, and must be taken into consideration."

The Guayule shrub is about two feet high, with knotted, spreading branches and sparse, greyish leaves. The whole plant contains rubber, with the exception of shoots bearing leaves and flowers. Consequently the whole plant is gathered and the supply is rapidly exhausted on the area, where gathering is done. Even the roots are in most cases pulled up by the collector, and the opportunity for re-growth is reduced to a minimum.

The rate of growth is very slow, so that a plant 20 inches high is three to four years old, while plants five years old are not more than 30 inches high. Such a plant would weigh about four pounds. In view of these facts it seems more than illusionary to speak of growing the Guayule plant for commercial purposes. Brought under domestication the plant could naturally be made to grow much faster, but there are still other factors to be taken into consideration. The dry country in which the Guayule plant grows, has a very scanty and irregular rainfall. For an agricultural crop that kind of land can hardly be expected to supply the necessary requirements, and the uncertainty about the germination of the seeds brings in such an element of chance, that indeed very much

faith in Providence must be present to undertake the growing of Guayule without any provision for occasional artificial irrigation. The price paid has been as high as $43 per ton of dry plants, pressed into bales, and delivered at railroad station. With that price, and the slow growth of the plant it is difficult to see how anyone can in earnest consider the cultivation of Guayule. Factories operating a large area should naturally take some steps for re-covering the ground with Guayule, but beyond sowing the seeds, and taking the chance of their germinating, and growing in a few years to a size, that can be utilized, it is hardly possible to do anything.

As for the fear of Guayule filling the market to the exclusion of crude rubber from previous sources of wild tropical rubber and from present and future plantations, such an idea is hardly worth refuting. If we remember that the requirements at present of the United States alone amount to more than 60,000,000 lbs. annually, a simple mathematical calculation, based on the most exaggerated expectations of the output of Guayule rubber from the entire territory where it is growing, will show the rôle this product could have in the world's market, even supposing that the supply was inexhaustible and as large as claimed by Guayule enthusiasts.

It may be added that the quality of Guayule rubber is very inferior, the rubber being very sticky and rapidly deteriorating. The market value is very low in comparison with that of first class rubbers, but it still leaves a wide margin for profit, and the supply of rubber plants is apparently enough for a few factories, not too closely situated. As a special product the Guayule has a market of its own, and if cultivation of this plant can be accomplished on a profitable basis, it will prove a great boon to the sterile parts of Northern Mexico.

Another rubber plant of Mexico, *Euphorbia elastica* has been spoken of. I have seen the plant, but not been able to obtain a sample of the product, which I understand, however, somewhat resembles the Guayule rubber.

Postscript.

I may have failed to convey a right idea of the extent of our Mexican rubber industry in my discussion on the previous pages. But I hope I have drawn the reader's attention to the fact that, although we may be far behind other countries in our methods, we are trying to do things as best we can. There has been much to bring our rubber planting industry into disrepute. But we are by no means down-hearted, and we feel confident that we shall, some day, be able to do our share in contributing to supply the world with that valuable commodity, rubber. The area now planted will yet be largely increased in Mexico and all through Central America, but I do not think this need cause rubber planters, present or prospective, in other countries any concern. There is plenty of room, and with more rubber produced we will have more articles made from this staple, for the benefit of mankind.

THE CEYLON EXHIBITION.

We have received the Report on the Ceylon Exhibition of Rubber by Mr. ZACHARIAS, an interesting pamphlet of 24 pages, well worth study, an interesting point brought out is the excellence of the Duckwari Para biscuits grown at 2,500 feet elevation in Ceylon and coagulated with tartaric acid instead of acetic. This seems to show that at certain places at least at this elevation, rubber can be grown successfully, but it is only fair to point out that the acreage is only 1½ acres under cultivation there and that as Mr. ZACHARIAS points out the excellence of the sample may be due to the use of tartaric acid. It must also be remembered that the Ceylon exhibits were only 5 lb. exhibits. Whether the rubber is actually better, and can be produced in as large quantities over 2,000 feet elevation remains to be seen. Perhaps also it is worth while again pointing out that actual elevation of feet from sea level, is by no means the only factor to be taken into consideration in mountain cultivations, temperature, prevailing winds, humidity and probably other factors as yet obscure come into play, and I have reason to conjecture are of more importance than altitude in feet.

Ceara rubber produced quite a sensation at the show. The best trees were grown at elevations of 1,500 to 3,000 feet in Ceylon. The rubber was considered by the judges equal to or better than Para rubber. The best sheets, from Kondesalle, however, were only the produce of 300 trees, from 8 to 20 years old. Here again one would like to see more the results of extensive cultivation and larger samples. That in some places there is a distinct field for Ceara rubber one cannot doubt. That rubber of first class quality in spite of its excess of resins can be procured from it, is proved by these samples. But one must remember the immense amount of Ceara rubber which has been at different times planted throughout the East and the very few trees which survive.

There is an old tree of Ceara rubber in the Gardens which constantly fruits. It grows in a sandy patch where many plants will not grow. Here and there however seedlings have come up and grown one or two with fair sized trees, but exclusively on the few sandy spots in the neighbourhood. In the richer soils where Para rubber is doing well, it seems to fail, either not germinating at all or when grown dying away.

A large number of prizes were offered for machinery and methods, many of which were not competed for, some of the classes were indeed rather vaguely described, and of some, e.g., best machine for destroying stumps, and best machine for uprooting stumps, practically the same thing, the well-known American stump rooters would do just as well for Para rubber trees as for any others. A silver medal was awarded to Mr. BIRD for using cream of tartar instead of acetic acid. The use of tartaric acid and its effects on rubber was pointed out by Ch. WEBER many years ago. Acetic acid was substituted for it chiefly on the ground of expense.

BROWN & DAVIDSON's smoking machine and that of MACADAM, seem very ingenions as is Mr. BAMBER's curing house to judge from the description, but whether these expensive apparatus (as one judges they must be) will ever be practically of use remains to

be seen. The tendency in future will be to simplify machinery and methods, and make rubber as cheaply as possible, rather than to turn out an exceptionally fine form at a high expense, for which only a very small extra remuneration will be obtained. I remember sending for sale two lots of rubber together, one very carefully prepared which fetched the top price of the day. With it was put in some which had been prepared roughly in the course of experiments and was quickly smoked and sent with the same lot rather than waste it. This lot fetched ½*d.* pound less than the carefully treated lot, merely on the ground that it was darker, due to its having been smoked. This of course does not imply that any rubber badly prepared will do as well as first class rubber, but merely that there is a limit to the expense which can be gone to in fancy machinery and methods. The best apparatus for removing mechanical impurities seems to have been very successful, and in cases of accident in the factory would be invaluable, but one is inclined to consider the best way of preventing sticks, leaves, and sand from getting into the latex is to discharge any coolie who lets them get in. Still for all these machines there may be a use some day, and to the inventors is due much credit.

Mr. Kelway Bamber's work on vulcanization of the latex is one of considerable importance, though as Mr. Zacharias points out the different manufacturers have different methods of working up the "dough" for which Bamber's vulcanized latex might be unsuitable and it is improbable that factories of general rubber goods would be started here even when the Peninsula turns out 5,000 tons of rubber per year, but for articles of local consumption could it not be utilized? e.g., for flooring, ceilings, partitions in houses in place of the match boarding so quickly destroyed by termites.

The other lectures and discussions at the show are more shortly treated of by Mr. Zacharias. They were printed in full in the "Ceylon Times" and elsewhere. Tapping and yield questions were discussed and some curious facts brought out, such as that the cuts on the left side of a herring-bone produce 25 per cent. more latex than those on the right; that an equal amount of latex is obtained by tapping on alternate days to that obtained by tapping daily and that repeated tappings though producing more latex produce less rubber. All these points require further investigation, as they, except the last are quite at variance with what happens here. Pests were treated of by Mr. Petch and Mr. Green. The former strongly condemned close planting and cutting out, on the ground of injury caused by decaying stumps and quite rightly too. Catchcrops formed the subject of one discussion, but only cotton and camphor both useless in the Peninsula and lemon grass were talked of. There are a number more of suitable plants, at least in the Malay Peninsula. In the discussion on markets and forms of rubber the day of biscuits was it was pointed out, gone. Nor was crepe likely to continue much longer. The Lanadron blocks were a revelation to the other planters, and block rubber will probably be the form of the future. For packing Mr. Devitt recommended strong clean cases to hold 100 to 150 lbs. of rubber with no packing.

Mr. Wright raised the bogey of over-production with an array of figures in which the wild sources are to supply as much for the next ten years as they do now, in spite of the fact that they are diminishing rapidly, and estimating that the 250,000 acres under rubber in Indo-Malaya will be in bearing in 1915, which is impossible as Mr. Zacharias points out. The report concludes with pointing out not only how successful the Exhibition was and how well carried out, but its immense value in measuring the distance that the industry has accomplished, and showing what has been done and what has yet to be done, and all who have been there or read the reports of the meeting must fully endorse this.

THE CEYLON RUBBER EXHIBITION, 1906,

By J. C. Willis.

Director, Royal Botanic Gardens, Ceylon.

An extremely successful Exhibition of Rubber has lately been held (September 13th—27th) in the Royal Botanic Gardens at Peradeniya, Ceylon, and marks a distinct stage in the progress of this great new industry, an industry which owes its inception and progress entirely to the forethought and aid of scientific men at the various Botanic Gardens of Kew, Ceylon and Singapore.

Extensive buildings were erected in the Kandyan (or Sinhalese mountaineer) style of architecture, and were well filled with exhibits of raw rubber in its different forms from the plantations of Ceylon, the Malay Peninsula, and India, tools for the tapping and collecting of latex, manufactured rubber and rubber goods, and other things, besides exhibits of raw rubbers from all corners of the globe. Two large sheds were also filled with machinery for the treatment of the latex, and there were interesting side shows as well.

We do not propose to go into details as to the exhibits, but to give some of the chief facts connected with the industry, and some of the chief lessons learnt at the exhibition.

Ten years ago there was practically no rubber in cultivation of the 'Para' kind (Hevea brasiliensis), the kind that is now almost exclusively attended to. Seed was then all but impossible to obtain, and though a small "boom" in this produce took place in Ceylon in 1898-9, the supply of seed was too small to allow it to go far. Only since 1902 has there been plentiful seed and the industry has expanded very rapidly till now in Ceylon there are about 110,000 acres, in Malaya about 60,000, and in other countries probably 40,000, say 200,000 acres in all, to say nothing of perhaps 100,000 acres of Castilloa elastica in Mexico.

The primitive methods of tapping the trees in V's with a hammer and chisel have now gone out, and the favourite methods are to cut spirals or herring bones on the trees, and pare the edges of the cuts at intervals of from 2 to 10 days, thus getting the advantage of the wound-response discovered by the writer in 1897 and worked out in detail by Mr. Parkin in Ceylon in 1898-99. The second tapping of a given area gives more latex than the first, and the amount often continues to increase for some time.

For paring the cuts there were many knives exhibited and gold medals went to the Bowman-Northway and Miller knives, both of which are simple, keep sharp, and pare thin shavings without any dragging of the cut edges. It is very important that the shaving should be thin, as the bark should be made to last about four years before it is all cut away, in order to allow the renewed bark time to ripen fully.

The yields obtained on some estates have been phenomenal, but it is probable that in many of these cases the bark has been too rapidly cut away, and that a period of waiting for the renewed bark to ripen will ensue. It is not as yet safe to count on more than a pound a year a tree, if so much, but even this means 150-200 lbs. an acre, an amount sufficient at present prices to yield an enormous profit.

Hitherto the Ceylon rubber has mostly appeared upon the market in form of "biscuits"—flat pancakes about 10 inches in diameter. The Malayan has mostly been in "sheets" about two feet long. But both these forms seem destined to disappear in favour of block—rubber prepared by blocking the sheets, biscuits, or other form under high pressure. Some samples of block were shown by Lanadron Estate, Johore, and similar samples have lately been getting the highest prices on the market.

The Ceylon and Malayan rubber has been obtaining higher prices per pound than any of the 'wild' rubbers, even 'fine Para' the standard of the market, but pound for pound of pure rubber is really getting lower prices, for the Para rubber contains about 20 per cent of moisture. Why this should be so is one of the greatest problems before the investigation at the present moment.

Anyone comparing a sample of fine Para with one of any plantation rubber—Ceylon, Malayan, or Mexican—can see at once that the former is more springy, returning more readily to its original shape when stretched. The higher price really obtained for this rubber may therefore probably be explained on this consideration.

Now is it because the trees are young that the rubber is weaker, or because the rubber is not smoke-cured? Is it because the rubber is in biscuit or sheet instead of in blocks? Is it that it is too much dried (Para rubber contains 20 per cent of moisture)? Is it that it is too pure and too much washed? Or is it that it is not coagulated in the best way? All these, singly or in combination, are possible explanations, and there may be others.

There is no doubt that older trees give stronger rubber, but that if even the oldest trees in Ceylon—30 years old—is not equal to South American rubber. Smoke-curing (without coagulation at the same time) seems to strengthen the rubber, and block rubber, besides its saving in cost of freight, and exposure of less surface to oxidation, seems actually stronger than sheets or biscuits. The great dryness of the plantation rubber may also have something to do with it, and experiments are now being tried by the Peradeniya institution in the preparation of block from wet biscuits.

To anyone looking forward a little, one of the most interesting exhibits in the show was the vulcanised and coloured rubber exhibited by Mr. M. K. Bamber, Government Chemist in Ceylon. Mr. Bamber acts, not on the coagulated and macerated rubber, but directly on the latex with the necessary re-agents, and then coagulates, giving a perfect intermixture.

The coagulated rubber can then be worked up into whatever is required in the ordinary way, and finally heated, when it vulcanizes. One of the most promising of his exhibits was the mixture of fibre and rubber. The fibre, cleaned, is soaked in sulphurized rubber milk, coagulated and then dried, and finally subjected to hydraulic pressure and vulcanized the result being blocks suitable for pavement, etc. By this method rubber can also be turned out of any colour desired, and the colour will not wash or crack off—a great advantage for children's toys. One of the most noteworthy features of the Exhibition was a series of daily lectures on the various parts of the rubber industry—cultivation, tapping, shipment to London, vulcanization, catch crops, pests, etc., etc., and these lectures, with the reports of the judges, description of the machinery, and other things, are now being put together into a book which will form a standard treatise,* to be in the hands of everyone interested in rubber.

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* The Ceylon Rubber Exhibition Handbook by J. C. Willis, M. K. Bamber, and E. B. Denham. To be obtained about the end of the year from Dulau & Co., 37 Soho Square, Messrs. Wyman & Sons, Limited, Fetter Lane, London, for 7*s*. 6*d*. net.

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THE OIL-PALM,

WITH PLATE.

The African Oil-palm is an abundant plant almost all over tropical Africa and has thence been distributed all over the world, and grows and thrives in all parts of the tropics. It is very common in cultivation in Singapore as an ornamental plant, as it grows very readily and well and fruits regularly. Its fruits produce the oil known as Palm-oil, which is exported extensively from Africa, but of which no use is made in Eastern Asia. There is no reason for its not being cultivated for profit as it gives a good return in Africa at little expense, and Dr. PREUSS, who knows the plant well in the German African Colonies where it is an important article of trade was surprised on seeing how well and quickly this plant grew in Singapore, that it was not cultivated for profit, as he affirmed it was a more valuable palm than even the coconut.

An attempt to introduce the cultivation into Labuan was made by Dr. (now Sir) JOSEPH HOOKER in 1876. Mr. TREACHER was then Governor of Labuan, and took much interest in the idea. The island of Daat was selected as a suitable locality and seed was sent from which 700 plants were raised which throve well and fruited, but ten years later were removed to make room for coconuts. (Kew Bulletin 1889, p. 259).

The plant has long been cultivated in Singapore. It was in the Botanic Gardens in 1895, and is to be seen in almost all private grounds.

In Central and Western Africa it is one of the most important economic plants and as Dr. PREUSS says it is the only plant in the world which can with the least possible care, and without diminution of crop furnish a rich harvest for many decades.

The annual export of Palm-oil and kernels from Africa is valued at 50 million marks.

Cultivation.

The Oil palm is raised from seed, which can be sown in beds, and later planted out, when they are about a foot tall. They should be planted not less than twenty feet apart. The soil it prefers is damp semimarshy soil (S. FREELING in Kew Bulletin 1889, p. 262), where water however, does not stand. In arid dry soil it becomes stumpy and grows very slowly sometimes bearing at four feet, instead of developing to 10 or 12 feet in height. This account o, the plant as it grows in Lagos is quite confirmed by its habits heref In stiff clay it makes hardly any growth. Plants grown in the gardens in this situation have in 18 years or more not made a stem more than two feet tall while trees planted at the same date in a lower and damper spot are magnificent trees of 20 feet tall. The biggest or rather tallest one in the gardens, forty feet tall, is growing in damp ground with the sago palms. It may be about thirty years of age. One planted by the edge of the lake where it has much water but not stagnant water at its roots, has only attained since 1897, a height of 2 feet, but it fruits heavily.

There is some advantage in having the tree not too tall, as it is easier to gather the nuts and to protect them too from squirrels which are very partial to them.

The palm does not seem to possess many enemies. A species of *Rhynchophorus* attacks it in Africa but according to Dr. PREUSS, does not do much harm. I have never known the common coconut *Rhynchophorus* nor the larger species attack it.

The tree begins to fruit about 5th and 6th year, and is said to last in bearing for 60 years or more, and produces three or four more rarely five or as many as seven bunches of fruit in the year. There seems to be some variation in the returns in different parts of Africa. PECHUEL LOESCHE states that each bunch weighs 30 kilogrammes, from which 2·94 kg. oil and 3·84 kg. kernels can be got. Its yearly output is 120 kg. fruit or 11·76 kg. oil, and 15·36 kg. kernels.

WARBURG says a planter can reckon on 50 kg. fruit a year. In the Kew Bulletin it is stated that 3,276,000 gallons of palm-oil are the product of 1,638,000 trees which gives 2 gallons of oil to each tree. MOLONY says each tree gives 40 pounds weight of fruit, and it takes 30 to 35 pounds of fruit to make a gallon of oil.

The tree in good ground here certainly fruits well, but no record has been kept of the weight of fruit produced. Dr. PREUSS when on a visit to the Gardens expressed surprise at its fertility and was still more surprised that it was not cultivated largely in a country so well suited for it.

Preparation.

The native method of obtaining the oil is to throw the sprays of fruit which contain as many as 4,000 nuts into a pit till they become somewhat decayed. The fruit is then pounded in a mortar till the husky fibre covering the nut is loosened. Then they are placed in large clay vats filled with water and trampled on till the

oil comes to the surface, when it is collected and boiled to get rid of the water (*Simmons Tropical Agriculture*).

In Togo the fruit is trodden out in a wooden trough (Tropen Pflanzer 1899, p. 125).

On the Gold Coast when the nuts are ripe they are cut and thrown into pits till a sufficient quantity is obtained to make oil. During this time they undergo a small amount of fermentation and the produce is known as "hard" oil, the fresh nuts giving a "soft" oil which is more highly valued in European markets. The nuts are then boiled to soften the fibre, heaped up in stone troughs and beaten with sticks till the fibre is loose. The heap of nuts is then covered with plantain leaves and left for twelve hours when great heat is developed and a quantity of oil runs off. The nuts are then washed in hot water and the fibre separated and squeezed by hand. The oil is then boiled to separate the water (W. F. HUTCHINSON in Kew Bulletin 1891, p. 190).

As is pointed out in the above article, the process is defective in every stage the nuts should be treated fresh and when just ripe, and should not be allowed to ferment as this darkens the colour of the oil and causes it to harden. The separation of the fibre by beating and hand squeezing is slow and imperfect, and machinery and hydraulic presses should be used. A quantity of the oil, 25 per cent is lost, by the imperfections of the method and the final boiling of the oil darkens it.

Owing to the great export of the oil from Africa, however, machines have been invented for decorticating the kernels and pressing out the oil; one of which invented by the firm Haake of Berlin, won a prize offered by the *Kolonial Wirtschafticher* Committee, of 1,500 marks, which seems to do its work very well (*Revue Cult. Coloniales* 1904, p. 56).

Palm-Kernels. The seeds of the oil-palm also produce an oil of value, and it can be obtained from the fruit of which the palm-oil of the fleshy covering has been removed and from seeds picked up, fallen beneath the trees. The kernels are hard and woody, and require to be dried thoroughly in the sun, and shipped home as palm kernels.

To make oil from them locally the native pounds and grinds the kernels very fine. They are then put in cold water and stirred by hand, the oil rises in white lumps to the surface, is collected and boiled. It is of a light straw color, but exposed to sun and dew becomes white. This gives white kernel oil. Brown or black kernel oil is made by frying the kernels in a pan and pounding them in a wooden mortar and then they are finely ground, then thrown into boiling water when the oil floats on the surface and is skimmed off. The remains of the pounded nuts are removed from the fire and spread out in a bowl to cool, ground again and beaten by hand with a little water, till the oil comes out in small pellets; when this is seen a large quantity of water is added and the oil floats on the top. It is skimmed off and boiled. Of course, however, the oil would be

better obtained by machinery and as there are already oil-mills in Singapore, should the plantbe cultivated in sufficient quantity, it would pay best to send the oil-seeds direct to the factory.

A machine has been invented in Germany which hurls the seeds against a plate with such force as to break them and set free the kernel, and this machine is found to be a very satisfactory working one.

The kernel oil is more highly valued than that of the husk and is always in demand.

There seems no doubt, that this plant may well be worth planting for the sake of its seeds and oil pulp in the Malay Peninsula, as it requires really hardly any attention except in actual planting and gathering the seed.

The plate we give represents a fine oil-palm in the Botanic Gardens, Singapore, on which is seen a fine specimen of the birds-nest fern *Thamnopteris Nidus-Avis*.

H. N. R.

NOTES ON THE CEYLON RUBBER EXHIBITION SEPTEMBER, 1906.

The Ceylon Rubber Exhibition owes its unqualified success to various factors. It was the first of its kind and held at a time when interest in rubber cultivation was very great, and at a time when many scientific and practical men were busily considering the improvements in methods of cultivation and preparation. It was held in perhaps the most suitable place in the British tropical agricultural possessions, Peradeniya, where Science has been helping agriculture in a more successful way than any other place except perhaps Java, in what are considered by many the most beautiful gardens of the world, with a climate not hot to allow of the strenuous work of properly examining such an exhibition. Arrangements were made that all departments in the cultivation and preparation of rubber for the market should be represented.

The beauty and situation of the buildings were such as could probably not be contrived in any other country in the world, and His Excellency the Governor, Sir HENRY BLAKE, by his constant interest in the arrangements, made certain that every thing would be done as well as was possible.

The present position of the rubber growing industry in its infancy tended greatly towards a common helpfulness between all those who attended. When an industry has been in progress for many years, new ideas however good are apt to be stifled by the wet blanket of old experience with its unwillingness to be improved upon by younger men. In the case of rubber cultivation at present the democratic feeling of equality in knowledge helps to a free exchange of information in which all give and gain.

The Scientific worker got data from the practical man and the practical man learnt the why and wherefore of many things he had observed.

The expert brokers from London gave their views freely and had explained to them all the difficulties and intricacies of the producer.

The British planter is always a pleasant man to meet at work or at play and the social side of the Exhibition was with the personal patronage of Their Excellencies Sir HENRY and Lady BLAKE and the cameraderie of the Ceylon planting man, in safe hands.

With regard to the preparation of rubber for the market the lessons learnt at the Ceylon Exhibition were:

That the present practice of coagulating in separate vessels of small capacity was impractical for any but the smallest estates with few trees in bearing.

That the making of separate sheets or biscuits has many disadvantages such as the necessity for large rooms for storing the large area which the rubber exposes to the attacks of mildew and bacteria and to the falling of dust particles all of which decreased the market value of the rubber.

That the making of continuous sheet or crepe had also the disadvantages of exposing large surfaces.

That these dangers of damage to the rubber were practically removed by the making of block rubber which the representatives of the buyers in London who were present at the Exhibition as judges asserted to be sure of being well received in the home markets. This opinion has been since fully endorsed by the prices which have been paid for block rubber in London.

That the present methods of careful washing and drying plantation rubber may be defeating their own purpose. The desire to eliminate all trace of resins and proteids from the rubber has led to repeated washings, so that the percentage of these substances is reduced to a minimum. In the same way the extraction of as much of the water as possible has been the aim of the planter in Ceylon and Malaya and rubber is now often so thoroughly dried that less 5% of water is present. The effect upon the physical properties of the rubber by the extraction of practically all the water and the proteids and resins has not yet been thoroughly investigated and without analyses of a series of rubbers which have been kept with and without these substances it cannot definitely be stated whether the Eastern planters' methods improve or decrease the physical properties which give rubber high market value, *viz.*, elasticity and resilience.

That Brazilian Para rubber possesses these desirable ch racters more than plantation rubber has been demonstrated by testing machines, and is accepted as a fact by both producer and buyer. The causes of this superiority in elasticity and resilience have not

yet been satisfactorily explained. The only data we have to base any theory on are, that Brazilian Para rubber comes from trees of much greater age than those which give the plantation product rubber. We have however trees over 30 years old in the East and the rubber from these does not show very markedly that it has the brazilian properties of elasticity and resilience.

Plantation rubber to describe methods briefly is coagulated soon after leaving the tree and then pressed by rolling or simple pressure until a large proportion of the water is expelled the partially dry rubber is then dried by hanging in hot dry air and is not packed in for shipment until contains a very small proportion generally less than 2% of water. On many Estates the rubber is during the rolling process submitted to a constant stream of water which has the effect of washing out the resins and proteids.

The Brazilian method is to coagulate in thin layers by means of smoke which contains acetic Acid which induces coagulation and creosote, which prevents the growth of organisms causing tackiness and putrefaction. No steps are taken to eliminate the water and the mass of coagulated films contain 15 to 20 per cent. of moisture.

The method of coagulating by thin films impregnated by smoke produces a mass which has in itself an automatic pressure. Each film on contracting acts as a very thin tight rubber bandage and thought it is difficult to estimate it is probable that the pressure throughout the mass is considerable and might be represented by considerable number of pounds per square inch.

The Brazilian differs in its preparation from the Eastern plantation rubber chiefly in regard to its being coagulated in thin films without extracting the water and antisepticized by means of creosote in the smoke to which it is submitted.

Whether the antiseptic substance can be added as satisfactorily to the liquid latex as it is when deposited from the smoke requires a careful series of observations. I am inclined to think that it can be more intimately incorporated when mixed with the latex before coagulation, than when applied during or after the process of coagulation.

The Exhibits of rubber with the exception of the block shown by the Lanadron Company and some similar blocks exhibited by Mr. C. O. MACADAM of Culloden Estate, Kalutara, Ceylon, included nothing new. Biscuits, Sheet, Crepe, and Scrap, all of very fine quality were shown from Ceylon and Federated Malay States. The size of the Exhibits sent by planters from the latter who had not limited themselves to the 5 lbs. which was given as the smallest amount admissible, gave the benches where the Malayan rubber was shown a more imposing appearance, than the meagre show of some of the Ceylon Exhibits in which only a very few biscuits or a small amount of sheet or crepe was sent.

The most interesting result of the judging from a Ceylon and

South India point of view was the fact that rubber grown at a height of over 3,000 feet took the first prize.

That Hevea would grow at these elevations was known but the marketable value of the rubber produced from trees grown there had not been proved. The trees from which the prize rubber was taken were about than twenty years old so that they might have been expected to give a good quality of rubber but to get the first prize was a fine testimony to the value of the rubber produced on the hills.

Not so much light was thrown on the question of best methods of extraction of latex from the tree by the exhibition as in other directions. However a large series of knives and prickers were exhibited and submitted by the judges to a series of practical tests. The judges wisely drew up a careful list of the "points" which should be considered in awarding marks to each knife. While efficiency for its purpose is of the greatest importance, the stern requirements of work on an estate, make any knife which is not cheap and simple of little practical value. The knives which received the two chief awards were the "Northway" and "Miller-Macadam" the latter having advantages over the former but being to some extent an adaptation of it. The principle of a guiding pointer or runner (like the end of a sleigh runner) which keeps the knife in the grove, is the chief point in both knives and the fact that, especially, in the Miller-Macadam knife the edges can be easily sharpened is of value. A good many very ingenious and effective knives were exhibited, which in the hands of a European planter or a skilled and careful native could do more perfect work than the simpler weapons but their more or less complicated adjustment and the fact that carelessly used great damage could be done, was against them as a suitable tool for coolie labour.

The tools that were exhibited as "prickers" were in nearly all cases not prickers but revolving or stationary knives with spaces, and in some cases more than 50 per cent. of the surface was cut. That the cambial tissues of the tree can recover from the injuries of these weapons as easily as from the knife cutting on one plane requires to be proved. No pricker has yet been put on the market which makes a prick or pointed puncture and if it was it is probable that the small amount of latex extracted would discourage its use.

There were not so many new machines for the preparation of latex as perhaps might have been expected. To take them in the order of the process of converting latex into market rubber; the centifugal filtering machine of Mr. MACADAM gave excellent results and will be of great use where large quantities of latex have to be dealt with. The latex is poured into the top of the machine passes by centifugal force through a muslin bag and flows out as rapidly at the bottom free from all dirt.

Mr. KELWAY BAMBER'S centrifugal cleaning machine, which as well as the former obtained a medal, effected a still higher standard of purity. It is possible that some very minute grains of sand may

pass through the meshes of the muslin in the Macadam strainer but in the latter all substances of higher specific gravity than caoutchouc or water are eliminated. For the removal of scraps of bark Mr. BAMBER'S machine is not so suitable as the weight of these particles is not sufficient relative to the caoutchouc and water to throw them out. The fact that in the London market a slight grittiness to the feel in rubber showing the presence of minute grains of sand is considered to lower its value points to the gain of using a machine that will eliminate these small particles which may pass through the sieve.

The classes for coagulating methods both mechanical and chemical produced very few entries.

The class for machines for rolling and washing, with rollers prepared either for crepe or sheet, did not contain any novelties chiefly because no rubber machinery manufacturers from Europe or America sent exhibits.

The Michie-Golledge machine awarded the gold medal, is a revolving drum within which centrifugal and centipetal forces are exerted to quickly induce coagulation was seen daily working in the show yard and performed its functions very efficiently and expeditiously.

Latex poured into this machine was in less than five minutes coagulated and removed in large masses ready for treatment in the washers and rollers.

A prize was awarded to Mr. W. J. BIRD, Duckwari Estate; for a method of inducing coagulation by means of Cream of Tartar (Tartaric acid). The results from the use of this reagent are excellent and it seems to be more efficient than the acetic acid which is generally used.

A screw press for preparing block rubber had been put up by Messrs. BROWN DAVIDSON & Co. and crepe rubber was treated in this with very successful results. The block was pronounced by the rubber judges to be of the highest quality. This press was the only blocking machine shown and received a medal.

The attendance at the Show and the interest taken both in the Exhibitions and in the lectures and discussions which took place almost every day, was excellent in regard to as Ceylon residents but the number of planters and others attending from other rubber growing countries was considering the importance of the Exhibition remarkably meagre.

Had manufacturers, planters and others interested in rubber cultivation in various parts of the world realized how much was to be learnt from attending the conferences and examining the Exhibits at Peradeniya there is no doubt that many would have been present. Probably not more than 20 representatives of foreign countries attended South India, Malaya and Central Africa being represented.

J. B. CARRUTHERS.

CHINESE ANTI-OPIUM DRUGS.

The sentiment against the habit of Opium smoking having attained considerable proportions, there has been no small interest aroused in drugs stated to be very effective in curing the opium-craving in constant users of the drug. Specimens of two plants have been lately submitted to me for identification which plants are said to be of the greatest value in combatting the opium craving. As is commonly the case when amateurs send specimens for identification the samples were extremely poor and of the Kuala Lumpur one I received five or six examples of fragments of sticks or roots and more or less damaged leaves, no flowers or fruits or even a complete spray of leaves, nor any information as to the appearance of the habits of the plants. It gives but little extra trouble to send really identifiable specimens, but it may as it did on the present occasion take many hours to identify scraps even if they are possible for any man to identify them.

However, Mr. J. B. CARRUTHERS, has since identified this species and his note is appended to this.

The first plant received is a herb from China belonging to the order *Compositæ,* about two or three feet tall with rather narrow lobed leaves and yellow flowers and the general appearance of a sow thistle. It is apparently a species of *Gynura,* and I cannot distinguish it from *Gynura ovalis,* Dec. the *G. pseudo-china* of the Flora of Hongkong.

There are a number of species of this set of *Gynuras* described from the east, and all are very closely allied if indeed they are distinct. One of these *G. pseudo-china*, possesses tuberous roots which are said to be used medicinally. This is a native of Madras and said to grow too in Canton. It seems to differ from the plant sent from China in the stem being scapigerous with radical leaves. The Chinese plant which I take to be *G. ovalis*, is very closely allied to a common weed here which has been identified in the Materials for a Flora of the Malay peninsula as *G. bicolor,* though it does not resemble the plant figured in the Botanical Register figure 110. The chief difference between the Chinese opium-antidote and the common weed here is that in the former the achenes are more distinctly hairy. No plant of the common weed here that I have seen has bulbous roots and the Chinese one is said to have thick bulbous roots.

Further information is much wanted on this plant. It may well prove that the common weed here is actually the plant required by the Chinese.

The Kuala Lumpur plant or plants have, it appears, got a much higher reputation. According to the *Malay Mail* many of the Chinese there have been seen going into the jungles with kandar sticks to collect the leaves. The price of the leaves went up to four dollars a pikul, and tied up in bundles, dried, they have been exported to China whence a bundle has been received from Mr. DUNN

of the Hongkong Gardens. It is stated that the leaves are "charred" and a decoction as of tea made from them. Beside the scraps forwarded from Kuala Lumpur above mentioned we have received samples from Dr. LIM BOON KENG, Mr. F. DENT, Mr. DUNN and ANIFF the Gardener at Kuala Lumpur. None bear a trace of flowers or fruit, consisting simply of sticks and leaves, and these belong to at least three kinds of plants. The one which seems to be the correct Kuala Lumpur plant, as leaves of it come in all the collections except the one from Hongkong is a scrambling or sarmentose shrub, with half-woody stems with a hollow centre, and no thicker than a rather slender penholder. The leaves are elliptic narrowed a little at the base with a nearly blunt tip, about 6 inches long and three inches wide or smaller thinly coriacious quite glabrous and with about 8 pairs of main nerves which join in loops some way from the edge of the leaf. The petiole is a quarter of an inch long or rather more. The leaves are opposite in pairs, exstipulate the whole plants glabrous except the petioles and shoots of young leaves which are slightly scurfy. This was all I was able to make out of the scraps sent, but Mr. CARRUTHERS has identified it as *Combretum Sundaicum* and Dr. TREUB of Buitenzorg to whom more adequate specimens were sent, also affirmed it was a *Combretum*.

Combretum Sundaicum Miq. is a climbing shrub, with foliage as above described and small round heads about an inch or inch and a half through of light greenish yellow flowers, and oblong or orbicular broad-winged fruit with 4 wings 1½ inch long. It is a native of the whole Peninsula, and I have specimens from Singapore, Johor, Selangor, Perak and Penang, where it grows scrambling over the bushes on the edges of the forests. It is commonly called Akar Kait-kait, and Gugamber, being mistaken for one of the wild gambers which it resembles in appearance. On a native collected specimen I have written by the collector "Pooga Tana, fruits used for headache." An allied species *C. trifoliatum* is used as authelmintic.

The method of using these drugs is not stated in a reliable manner anywhere nor has any information been received with the samples. It is said however that the shrub is charred and a decoction like tea made of it. That the drug has an unpleasant taste, and produces violent effects on the user at first. It is likewise stated that opium is added, to the bottle, and as the contents diminish fresh decoction without opium is added till the bottle practically contains no opium. The same plan of breaking off the habit by gradually diminishing doses as was utilized in the well known Gold cure for alcoholism many years ago.

Heavy opium takers seem to suffer from diarrhœa and pains in the abdomen on ceasing suddenly from the drug but this it is said goes off, and indeed it is stated that it is easier to break off the opium habit than the alcoholic one.

It is probable that the value of the drug is quite mythical, as several very different plants have been used, and a Chinese doctor declares he has had equally good effects with ordinary strong tea.

With the specimens received came some other leaves of different plants including those of a Ficus, these were either mixed accidentally in gathering or intentionally to adulterate the bundle.

The plant sent from Hongkong as having been imported from Singapore was quite a different plant. It is apparently the seedlings of some tree, about a foot tall with solid stem and elliptic or obovate leaves alternate and narrowed at the base cuspidate at the tip 6 inches long and three inches across with a petiole half an inch long thinly coriacious and glabrous, nerves ten pairs. The specimens are far too incomplete to furnish any idea as to what the plant can be, but it is not the *Combretum*. It is presumably collected for export only, but is perhaps as valuable as the genuine Combretum plant.

H. N. R.

PLANT USED AS OPIUM HABIT CURE.

About two months ago a Chinese Towkay sent to the Rev. W. E. HORLEY in Kuala Lumpur a concoction made from the leaves of a shrub growing about Seremban which he claimed was valuable for the purpose of destroying in opium smokers the desire for the drug.

At the same time anti-opium meetings were being held in Kuala Lumpur owing to a visit of a zealous anti-opium preacher, Mr. ALEXANDER, and large numbers of Chinamen applied for the concoction. Big vats for its preparation were erected in Kuala Lumpur and immense quantities of the "Medicine" were distributed amounting on some days to over 3,000 bottles.

The plant is *Combretum Sundaicum,* Miq. a plant native to the Malayan Peninsula and Archipelago.

It has not been previously credited with any medicinal characters but some species of *Terminalia,* neighbouring genus, are used in India and Ceylon for medicinal purposes. Chemical analyses was made by Mr. B. J. EATON the Government Chemist, Federated Malay States, and no medicinal substances except tannin were found.

Some plants which to some extent resembled in their foliage *Combretum Sundaicum*, were, when the demand .for material to manufacture the concoction was great pressed into the service but the chief ingredient of infusion was the extract from the species of *Combretum.*

The method of administering the drug is ingenious. To each dose of the concoction is added a proportion of half-burnt opium from the patient's pipe, the adding of this opium seems to be left to the patient and there is no control over the amount added if the patient does not wish to reduce the amount of opium he is consuming.

The sales of opium are however said to be much less and it appears that in many cases the "Medicine" has enable opium smokers who wish to desist to stop taking the drug.

J. B. C.

Ficus Elastica in Tonkin.

According to Mr. JACQUET, the Head of the Agricultural department of Tonkin, some difficulty has been experienced in propagating *Ficus elastica* in Tonkin, of the local variety when cuttings were made only 10 or 12 per cent. rooted and even then those that did become sturdy at first only ten per cent. could be saved, a greater success was obtained however with plants from Buitenzorg seed received in 1902. The Tonkin strain which failed originally, came from Java but has been cultivated at Hanoi for 20 years, the leaves are smaller than those of the Buitenzorg one, and it is suggested either that it is a different plant or that the climate of Tonkin has altered it, more success has been obtained in propagating by Marcottage but the plants require a good deal of care, and labour in watering it seems, especially in the dry years. In Marcotting it was found that the ordinary ring cut round the stem was difficult to make and the bough was apt to be broken off by the wind, so that longitudinal incisions of about two centimetres and a half in length were made, through the bark, a small clawed gouge was made which made four cuts at a time and saved time.

Somewhat elaborate plantations of the ficus are made for supplying marcots exclusively.

(Bulletin Economique, Hanoi, Nov., 1906).

Sanseviera in East Africa.

An article by Mr. RICHARD SORGE in the journal of Tropical Agriculture November 30th, 1906, on the exploitation of Sanseviera in East Africa possesses some interest, and extracts from it may be of some use to our readers. The Afro-American Company has Al Voi on the Uganda Railway a large concession of land at a height of about 1,800 feet altitude where the Sansevieras, *S. Ehrenbergi* and *S. cylindrica* are abundant.

These plants grow in rich soil characterised by the presence of *Euphorbias* and *Acacias*. These plants stand shade and grow without any care among the bushes. The exploitation is effected in this way. Each cooly brings to the factory 1,200 leaves a day in bundles of fifty which are conveyed in carts to the factory. Women and children cut the leaves in two lengthways. They are then treated by a machine and washed in water to remove the green colour of the plant which lowers the value 65 or 75 francs a ton. The fibre is dried in the sun, combed out with a rotary brush and pressed into

bales of 175 kilograms weight. The machine used is of mexican origin and made in America and is known as the Estrella, it costs 13,750 francs, and requires a ten-horse power engine. It treats 120,000 leaves a day and gives about 1,000 kilograms of fibre.

The machine naturally requires a daily supply of 120,000 leaves, The coolies work 7 hours a day at the outside and are free after they have brought in this number of leaves, The coolies are paid at the rate of 10 francs a month with food and lodging. There is no scarcity of labour.

The defibrator used is not perfect. It was originally designed for Sisal hemp. Another machine specially made for *Sanseviera Ehrenbergii* is to be installed. It is cheaper than the mexican one and does as much work. The cost of making the fibre is from 562 to 625 francs a ton, which at a sale of 750 francs gives a profit of 125 to 175 francs a ton, attempts are being made to lower the cost of transport to the factory. The weight of 120,000 leaves is 3,260 kilos which gives 1,000 kilos of fibres, so that 96% of the weight of the leaves carried to the factory is a waste product.

Both *Sanseviera Ehrenbergii* and *S. cylindrica* have been for some time in cultivation in the Botanic Gardens. The former is evidently not suited to the climate as it makes very little growth and the leaves are very short.

S. cylindrica does better, but planted out makes much slower growth than *S. guineensis* and *S. Zeylanica*. The two latter seem indeed to be the most suited for this region. The machine and general method of preparation described above may be however suitable for these species.

H. N. R.

Late flowering of Grammatophyllum.

The Grammatophyllums in the Botanic Gardens did not flower this year at their ordinary period of August and September at all. No flower spikes appeared on any of the plants. Now, however, after the violent and prolonged period of rain during December, all the plants have commenced flowering. The spikes appeared in the end of December, and are now January 7th, fully open, though not at their full height. Dr. SCHLECHTER who has lately returned from Java says that exactly the same thing occurred in the Botanic Gardens at Buitenzorg all the plants there missed the flowering season in autumn and are now commencing their delayed flowering. Grammatophyllum is such a punctual flowerer usually that the postponement of its flowering, both here and in Java, this year is worth recording.

H. N. R.

The Powell-Wood Process Syndicate.

So many letters have been received by the Editor asking for the details of this process, due to his having been mentioned in connec-

tion with experiments on treated samples of timber, that a few lines on the subject may be useful.

The firm known as the Powell Wood Process Syndicate, has its head-quarters at Temple Bar House, 28, Fleet Street, London. The process does not consist of a paint or solution as a number of correspondents seem to think, but is a system of impregnation of the timber by immersing it in a cold solution in open tanks gradually raised to boiling point and after being maintained at this temperature for a certain time according to the density of the wood is cooled down, and the timber removed to a drying chamber till the wood is dry again. The process thus requires a certain amount of plant, though not of a very expensive nature; samples of wood sent to Australia, Malaya, Africa and India, for experiment have all justified the immunity claimed by the Company for their process, which will probably be adopted by many timber users and dealers in the tropics.

H. N. R.

THE "BRITISH WORLD."

42, Old Broad Street,
London, E. C.
30th November, 1906.

The Editor,
Agricultural Bulletin, Singapore.

Dear Sir,—With the idea of developing trade with the Motherland, I am contemplating making a collection of the products of Greater Britain and I shall much appreciate it if you would kindly insert a short paragraph in two or three issues of your Paper stating that I shall be pleased to receive specimens (with a note as to where from and any information regarding the same) from your Readers of anything they are able to send me. I want samples, both vegetable and mineral, of not only such as are grown and obtainable at the present time but also of any new products that may come under their notice from time to time.

In the hope that you may see your way to reciprocate, I take pleasure in sending you a copy of the *British World*, which you will notice is founded for the promotion of trade and intercourse between the States of the Empire, and always at your service this end whenever I can be of use to you.

I have, etc.

The Editor.

The *British World* is a publication dealing with affairs of the various Colonies and with facts in the mother country bearing on the Colonies. It is founded for the promotion of Trade and

intercourse between the state of the British Empire. Perhaps some of our readers may feel disposed to assist the Editor in the way he asks.

Editor.

THE RAMIE GROWING ASSOCIATION.

This Association suggested a short time ago has now crystallized into a solid entity under the patronage of a number of wellknown people, with Professor ERIC DRABBLE as Scientific Adviser. The circular states that it is proposed to form a Ramie Growing Association to foster the growth of Ramie throughout the Empire and thus add a valuable asset to British Agriculture commerce and industry. Mr. EDWARDS RADCLYFFE the Honorary Secretary of the Association writes in his usual style concerning the cultivation of the plant, and its value most of which is wellknown to our readers, having been published and criticised in the Bulletin. The entirely erroneous statement that it is an easy crop to grow anywhere and that the fibre can be produced profitably at £10 a ton, still appears.

There is no doubt that if the Association gets to work as steadily as the Cotton Growing Association has done, and after the manner adopted for such Agricultural and Commercial industries as is done in Germany and elsewhere in the Continent, Ramie cultivation will at least have a good trial whether it succeeds on a large scale or fails. Nothing however will really come of it unless an intelligent Agriculturist versed in tropical and sub-tropical cultivations is first deputed to make an extended visit to all parts of the Empire, to find out why in so many parts of the world, a cultivation commenced some fifty or more years ago and tried on and off on large and small scales by a large number of professional Agriculturists has steadily and persistently failed to give any returns at all.

Attention is just now being paid more and more to fibre plants as the demand increases and the supplies do not, and there is probably a good future for Ramie, but it is absolutely essential that the pamphlets sent out by the Association are accurate and not misleading. Figures based on the cheapest labour in the world as that of China cannot be safe for countries where labour is five or six times as expensive, when dealing with a plant which requires a great deal of labour, like Ramie.

In many parts of the world Ramie has received a very bad reputation among planters, and it is essential for the purpose of the Association that planters advised by their pamphlets should not experience further serious disappointments owing to misleading statements in their publications.

If the case is put fairly before planters, further attempts to grow the plant will undoubtedly be made, and we may hope with considerable success.

In any case if the members of the Association thoroughly study the question of cultivation in all parts of the Empire and under all

circumstances and lay the results before the world they will have done much for this undoubtedly splendid fibre.

The address of the Association is that of the Honorary Secretary, D. EDWARDS-RADCLYFFE, Ramie Growing Association, Staines.

CO-OPERATION REQUIRED.

Under this title is an article in the India rubber Journal (October 22) which points out that there is a difficulty in obtaining Co-operation between the manufacturers of rubber goods and people collecting rubber, a planter suggests. "Surely it would be possible to get together from amongst the manufacturers a small representative Committee who would go thoroughly into the question of the best form of preparing rubber." He points out how conflicting the opinions of the manufacturers are on the subject. He then suggests that a subscription should be started among planters and planting companies so that first of all a fund could be got together sufficient to put through the work thoroughly. The manufacturers would select one or two good men to carry out the tests and pay them for their services. A paid secretary would be at the service of the Committee to relieve them of all clerical work. He considers that a subscription might be started among planters and companies for a fund to carry out the work, and is sure all planters would subscribe and that a committee of manufacturers could be got together to select experts and consult on the subject.

The editor of the India-Rubber Journal points out that at least £1,000 would be necessary and is dubious as to the planters subscribing this amount and points out that in isolated instances manufacturers have devoted a good deal of time to experiments in cultivated rubber but do not care to make the results public property, and others have gone into the matter in a half-hearted way, knowing quite well that they would not be able to spend the time needed to make their investigations anything but of the most preliminary nature. This is naturally the result of isolated experiments and there is a good deal to be said for having such experiments carried out systematically. The planter wants to know from the manufacturer exactly what he wants and to be brought into closer connection with him. The plan proposed does not however wholly commend itself. It would probably prove too expensive or at least unnecessarily so, and would require an up-to-date laboratory as well as chemical experts who could devote a great deal of time to the subject. Fortunately we have an establishment which is thoroughly capable of making the investigations and is in touch with the manufacturers and planters. This kind of investigation is exactly the kind that the Imperial Institute is intended for. It possesses a good laboratory and an excellent staff, and it would be far more to the purpose to utilize its services in connection with such experiments. The saving of expense in secretaries and what not is obvious. If a suitable experimenter could be found to devote his whole time to the rubber industry working in connection with the planter in the Colonies and the manufacturer in England the result would soon be

attained, both more cheaply, and in a better manner than could be done by isolated endeavours. Rubber is used for a vast amount of manufactures, and the manufacturers require different styles, and classes of rubber. A permanent rubber expert would be in touch with all the different classes of manufacturers. He would be able to give advice, as to the suitability of any kind of rubber for any different purposes. Planters at home on leave, and managers in town could consult him, on any necessary point. In fact he could become an authority on rubber cultivation and manufacture from the germination of the seed to the end of the history of the rubber as reclaimed rubber.

The planter in the Colonies and the merchant at home hardly yet realize fully the potentiality of the Imperial Institute. It is rapidly developing into a most important engine for the development of Agriculture and Commerce, and the co-operation required is with the Institute on the part of all planters, merchants and manufacturers in the Empire, and its dependencies.

H. N. R.

PLANTATION RUBBER.

Falling-off in Quality of Biscuits and Sheet.

Sir,—We should like, through your medium, to draw Planters' attention to the falling-off in the preparation of Ceylon biscuits and sheets compared with what it was when we recommended them to continue to ship their produce in one or other of these forms. Recently numerous marks have suffered severely in price in consequence of their roughness and black colour, and in many cases mouldy and resinous surfaces, upon their arrival here. In our opinion, the defects arise from want of care in curing, whether from want of factory space, or from hurrying; and that imperfectly-cured lots deteriorate on the voyage home and fermentation goes on, resulting in the resin exuding and spoiling both biscuits and sheets. That this can be avoided is proved by the high standard maintained by such marks as Culloden, Heatherley, etc., from Ceylon; Bukit Rajah, Selangor, Pataling, Jebong, etc., from the Straits and F. M. S. Of course, the Lanadron block leaves nothing to be desired; but everyone is not as yet in a position to block their rubber, and as a difference in price varying from 3*d.* to 6*d.* per lb. has often of late been made between fine biscuits, sheets, etc., and the dark discoloured and inferior lots, we venture to suggest that, as manufacturers have more or less got over their prejudice against crêpe rubber, planters should send it home in this form, and, we think, they will greatly decrease the evil referred to. In other words, it is much better to send home good crêpe than bad biscuits or sheets. Good scrap crêpe is also realizing excellent prices and chip crêpe up to and over 4*s.*

Recently, with larger supplies, buyers have been discriminating much more, and we find 5*s.* 6*d.* @ 5*s.* 8*d.* being paid for fine pale

biscuits and sheet against 5*s.* 2*d.* @ 5*s.* 4*d.* for inferior dark and mixed lots, while fine pale crêpe has brought 5*s.* 8*d.* @ 5*s.* 10½*d.* and fine pale Ceara biscuits up to 5*s.* 7¾*d.* Scrap has been very irregular but much dearer than it was formerly, although we do not understand buyers paying the prices they have for this kind, whether the quality was good, bad, or indifferent. We do not think this will continue, but a difference of 6*d.* @ 1*s.* per lb. will be established later on between common and good.

As was inevitable with the increase of supplies of plantation, the price has come nearer the price of fine Amazon smoke-cured Para, which continues firm @ 5*s.* 2*d.* per lb., although very fine pale-lots of plantation which have sold for colour still realize 6*d.* @ 8*d.* per lb. above the price of fine Para. The Amazon crop promises to show an increase this season, but, in spite of this, the demand is so enormous that there is no decline in price, and the heavy supplies are absorbed as soon as received.

Yours, etc.,

LEWIS AND PEAT.

6 Mincing Lane, London, E. C.
December 13th.

Messrs. Lewis and Peat enclosed with this letter the following circular on Plantation-grown Rubber:—

Details for Planters—Revised November, 1906.

Shape and Form.

Biscuits.—About ⅛-inch thick, and 10 at 12 inches in diameter, thickness and colour as even as possible.

Sheets—About ⅛-inch thick, 2 feet long and 1 foot wide. Rolled by hand or put through rolling machine with either smooth or ribbed rollers and running water. Colour and thickness as even as possible.

Block or Slab.—2 to 10 inches thick and 12 to 14 inches long or over, and any convenient width for packing. Weight from 5 to 25 lbs. each or over, packed in 1 to 1½ cwt. cases.

Crêpe.—Long strips 6 to 12 inches wide, sorted as follows:—
Pile 1 Pale and light amber colour (*i.e.* crêpe made from the No. 1 latex).
„ 2 Crêpe made from the scrap, pieces, etc., and any rejections from Pile 1 can be included.
„ 3 Chip Crêpe (Brown or Black).

Worms.—Pale and Dark should be kept separate and either packed loose in the cases or pressed into large blocks to fit the cases or in smaller blocks as most convenient.

Scrap.—When not turned into Crêpe the Scrap should be carefully picked over, and all bark, dirt, and badly heated or sticky pieces thrown out. Pale and dark should be kept separate. Virgin lumps and scrappy biscuits should also be kept out of the ordinary scrap and sent home separately.

N.B.—The aim of planters must be to get all their rubber as even in quality as possible—clear, bright and transparent with an even surface—colour light for preference, also strong and resilent as possible. Uniformity both as regards quality and colour are very important, so that manufacturers can rely on their purchases begin regular in both respects and not mixed and uneven.

All rubber should be dried in dark drying rooms and never exposed to the sun or bright daylight. Non-exposure to light also applies to rubber dried in vacuum driers or by any other patent method.

COAGULATION.—This can be done in pans or tubs, with the aid of a little Acetic Acid, say one volume of pure acid to 100 volumes of pure latex with a little water, which will in no way injure the rubber. This will take 8 to 16 hours. Latex coagulated in tubs on pivots with a little water and acetic acid well mixed insures evenness of quality of that particular collection, besides saving a great deal of space, also the latex is easily measured and the coagulated mass is quite easily cut into convenient chunks for the crêpe machine. The Michie Golledge Coagulator is a very quick and satisfactory coagulator, taking only a few minutes in the process.

Coagulating by smoke, as done in the Amazonas, is quite in its experimental stage, but samples of rubber so cured are undeniably stronger and better preserved than ordinary cures. A process is wanted to smoke, coagulate and cure the latex at one and the same time. The rubber is cured by the Natives in the Amazonas on a stick or paddle that they dip continuously into the latex, keep revolving in the smoke so that each layer of the rubber is smoked and the whole is cured right through and not on the surface only.

PACKAGES AND PACKING :—Strong boxes or cases any size from 1 to 2 cwt. No paper or other material should be used. It must be remembered that rubber packed in a damp condition arrives mouldy and sticky and that heat and tackiness nearly always spreads and where mixed with sound rubber invariably spoils it.

SORTING :—As far as possible, even as regards both quality and colour. Pale should be kept from dark and any inferior thrown out and sent home separately.

DRYING :—Great care should be taken to ensure thorough drying, so that biscuits and sheets especially should be dried right through and not superficially only. Badly dried biscuits and sheets sweat and the resin exudes and causes mould and very often stickiness on the voyage.

MARKING :—Block, biscuits and sheets and all cases should be stamped with the estate or Company mark.

ALLOWANCES—LANDED TERMS :—The old East India terms have been done away with and the only allowance now is ½ per cent. Draft, actual tare, and 2½ per cent. discount.

LOSS IN WEIGHT :—On parcels shipped in thoroughly good order is about ¼ to ¾ per cent, from Port of shipment to London.

London Charges:—Including fire insurance ½ per cent.

N.B.—All samples drawn for sale purposes are either returned to the cases or paid for by buyers and credited in the account sales.

Brokerage—½ per cent.

Pro Forma Account Sale—Example showing results—London Landed Terms and Cost, Freight and Insurance Terms.

Landed Terms.

		£	s.	d.
Twenty cases fine sheet, crêpe, biscuits or block:— (Actual tare) nett 4,480 lbs., landed terms at 5*s.* 6*d.*		1,232	0	0
In lieu of (old) E. I. draft, which used to vary at 1 at 2 per cent. and was dependent on the tare (new) draft ½ per cent.		6	3	2
		1,225	16	10
Discount 2½ per cent. ...		30	12	11
		1,195	3	11
Sale expenses, fire insurance—1 month, dock charges, including 4 weeks' rent, about ½ per cent. *say* ...	£ s. d. 6 10 0			
Brokerage ½ per cent.	6 2 7	12	12	7
		1,182	11	4

C.I.F. Terms (Delivered Weights)

	£	s.	d.
Twenty cases fine sheet crêpe, biscuits or block:— Nett 4,480 lbs. at 5*s.* 3½*d.* c.i.f. ...	1,185	6	8
Brokerage ½ per cent. ...	5	18	6
	£1,179	8	2

LEWIS & PEAT,
Rubber Brokres, 6, Mincing Lane, London.

GOW, WILSON & STANTON, LIMITED— Indian Rubber Market Report.

13, Rood Lane, London, E. C.
November 23rd, 1906.

At to-day's auction, 446 packages of Ceylon and Straits Settlements Plantation grown rubber were under offer, of which about 301 were sold. The total weight amounted to about 26¾ tons, Ceylon contributing about 6¼ and Straits Settlements over 20½.

There was hardly as much animation in the sale to-day as at the last auction, and prices were frequently a little easier.

The highest quotation was made by some Block Rubber from Lanadron Estate, which brought 5/9$\frac{1}{4}$ per lb.

Some very fine Ceylon biscuits from Culloden and Heatherley brought 5/7—this being the highest quotation for biscuits.

For sheet the best prices was 5/5$\frac{3}{4}$ per lb.

No really fine Crepe was brought forward.

QUOTATIONS.—Fine sheet, 5/5$\frac{3}{4}$.
Fine biscuits, 5/6$\frac{3}{4}$ to 5/7.
Good biscuits, 5/5$\frac{1}{2}$.
Crepe { Fine pale, none offered.
Palish to darkish, 5/4 to 5/5$\frac{1}{2}$.
Dark, 4/6 to 4/11$\frac{3}{4}$.
Scrap { Fine, 4/6.
Fair to medium, 3/4 to 4/2.
Low, 2/-.

PLANTATION FINE TO-DAY.—5/7 to 5/9$\frac{1}{4}$, same period last year, 5/9 to 6/0$\frac{3}{4}$.

DO. Scrap.—2/- to 4/6, same period last year, 4/6 to 5/1$\frac{3}{4}$.

FINE HARD PARA (South American).—5/2, same period last year, 5/2$\frac{1}{4}$.

AVERAGE PRICE OF CEYLON AND STRAITS SETTLEMENTS PLANTATION RUBBER.

301 packages at 5/2$\frac{3}{4}$ per lb., against 302 packages at 5/3$\frac{3}{4}$ per lb. at last auction.

Particulars and prices as follows:—

Ceylon.

MARK.	QUANTITY, DESCRIPTION AND PRICE PER LB.
Culloden	7 cases fine pale biscuits, 5/7. 7 cases good palish pressed crepe, 5/4. 1 case darker, 4/11$\frac{1}{4}$.
Ellakande	1 case good palish to dark biscuits, 5/4$\frac{3}{4}$.
Heatherley	1 case fine pale biscuits, 5/7. 1 case good darkish pressed crepe, 5/0$\frac{3}{4}$.
Culloden	2 cases inferior scrap, bought in.
Nikakotua	5 cases good palish cut sheet, 5/5$\frac{1}{2}$. 1 case similar, 5/4$\frac{3}{4}$.
Duckwari	1 case fine pale biscuits, 5/6$\frac{3}{4}$. 1 bag good pressed block scrap, 4/0$\frac{3}{4}$.
Kumbukkan	1 case dark heated block scrap, bought in. 1 case palish to darkish scrap and rejections, bought in.
Upper Haloya	1 case good pale sheet and rejected biscuits, bought in.
CL	4 cases good palish scrap, bought in. 1 case darker, bought in. 2 cases pressed block scrap, bought in. 2 cases palish crepe and pressed block scrap, 4/9$\frac{1}{2}$. 2 cases darkish crepe, bought in. 3 cases darker, bought in. 10 cases palish and darkish crepe, bought in. 3 cases darker, bought in. 16 cases darkish crepe, bought in. 1 case black, bought in. 2 cases darkish scrap, bought in. 4 cases palish crepe, bought in. 1 case thick palish crepe, 5/3$\frac{1}{2}$. 5 cases palish and darkish crepe, bought in.

Halgolle	1 case good palish scrap, bought in.
Maddegedera	1 bag good palish scrap, bought in.
Katugastota	1 case fine pale pressed scrap, bought in
Culloden	1 case darkish pressed crepe, 5/-.
Heatherley	2 cases darkish pressed crepe, 5/2.
M (in diamond)	1 case good pale biscuits, bought in. 1 case similar, bought in. 1 case good palish pressed scrap and dark rejections, 3/6. 1 case fine pale biscuits, bought in.
Clara	1 case good palish to darkish biscuits, 5/3.
Glencorse	4 cases good palish to darkish biscuits, 5/4½. 1 case good palish pressed scrap, bought in. 1 case cuttings, 4/2½.
Densworth	1 case good darkish biscuits, 5/5. 1 case similar, 5/5. 1 bag good pale scrap, 4/4. 1 bag heated scrap, 2/-.
Tallagalla	2 cases fine palish to darkish biscuits, bought in. 1 case good pressed block scrap, 4/5½.
Waharaka	2 cases darkish biscuits, bought in.
V S / K M	1 case darkish scrap, 4/3¼.
Tallagalla	1 case good darkish biscuits, bought in.
Ambatenne	4 cases good palish biscuits, bought in. 1 case good pae scrap, bought in. 1 case darker, bought in.
Elston	2 cases darkish biscuits, bought in.

STRAITS SETTLEMENTS.

Mark.	Quantity, Description and Price per lb.
V R Co Klang F M S	16 cases good palish to darkish scored sheet, 5/5¾. 2 cases palish to darkish pressed crepe, 5/3½. 8 cases darkish crepe, 4/11¼. 1 case darker, 4/9½.
S R Co Ld.	11 cases palish to darkish scored sheet, 5/5¼. 1 case good palish pressed crepe, 5/4¾. 1 case darkish pressed crepe, 4/10. 9 cases very dark, 4/6½.
P B	10 cases good large palish sheet, 5/5. 9 cases darkish scrap and rejections, 4/4.
S B	1 case rejections, 4/0¼.
S R Co.	2 cases black pressed crepe, 4/6.
B R R Co Ld.	26 cases good palish scored sheet, 5/5½. 5 cases good palish to darkish sheet, 5/4¼. 9 cases darker, 5/0½. 1 case dark, 4/8¼. 2 cases darkish and dark crepe, 4/11. 3 cases palish crepe, 5/5½.
Beverlac	10 cases good palish to darkish sheet, bought in. 3 cases somewhat similar, bought in. 6 cases good palish to darkish scrap, 4/4¾. 2 cases dark heated scrap, 3/11½. 2 cases inferior scrap, bought in. 1 case inferior scrap, bought in.
Highland Est.	3 cases very fine pale scored sheet, 5/5½. 7 cases somewhat similar, 5/5¼. 7 cases darker, 5/5¼. 8 cases palish thick crepe, 5/3¾. 4 cases darker, 5/0½. 2 cases dark, 4/11½. 6 cases darkish thick crepe, 4/11½.
Batu Unfor Est.	1 case fine palish to darkish sheet, 5/5½. 3 cases somewhat similar, 5/5½. 1 case palish crepe, 5/4¾. 1 case darkish crepe, 5/0½. 2 cases darker, 5/-.
B N A	10 cases palish to darkish sheet, bought in.
Beverlac	4 cases palish pressed crepe, 4/5¼. 3 cases inferior scrap, bought in.

Mark.	Quantity, Description and Price per lb.
Pataling	6 cases palish crepe, 5/1.
T E C B	3 cases palish and darkish crepe, 5/3
P S P R	1 bag pale crepe, bought in.
S R & Co.	1 case thick palish crepe, 5/4.
SP S	1 ase good palish scrap, bought in. 1 case rejected biscuits, bought in. 1 case heated pressed scrap, bought in.
SP	4 cases good palish to darkish scored sheet, bought in. 2 cases good rejected sheet and biscuits, bought in. 2 cases palish to darkish sheet, bought in 2 cases somewhat similar, bought in. 2 cases good palish sheet, bought in. 3 cases similar, bought in.
MGI 3 C D	2 cases dark biscuits, 5/4. 1 case thick rejected biscuits, 4/3¼. 1 cases good palish scrap, 4/5.
MCI S D	4 cases fine pale sheet, 5/5½.
L E Muar Straits	30 cases fine pressed block, 5/9¼. 4 cases darkish crepe, 4/11¾.
S P S	1 cases block scrap, bought in. 1 case palish pressed scrap, bought in. 1 case dark rejected biscuits, bought in. 1 case palish to darkish, scrap, 4/3½.
SP	1 case heated scrap, 4/-. 1 case similar, 4/3½. 11 cases good pale sheet, biscuits, and darkish sheet, bought in.
J E	8 cases good palish to darkish sheet, bought in. 3 cases darkish rejected sheet, 4/6¼. 7 cases palish scrap, 4/6. 2 cases similar, 4/4. 1 case darkish pressed scrap and rejections, 4/2½.
S P	1 case good palish sheet, bought in. 1 case darkish crepe, 4/11. 1 case darker, 4/9½.
F J R	4 cases pressed block scrap, 4/-. 3 cases pressed scrap, bought in.
S S B R Co. Ltd,	3 cases fine large palish sheet, bought in. 2 cases scrap, bought in. 2 cases good palish scrap, bought in.
Jebong	2 cases darkish crepe, 4/9½.

GOW, WILSON & STANTON, LIMITED— Indian Rubber Market Report.

13, ROOD LANE, LONDON, E. C.
December 7th, 1906.

At to-day's auction, 289 packages of Ceylon and Straits Settlements Plantation grown rubber were under offer, of which about 217 were sold. The total weight amounted to about 16¼ tons, Ceylon contributing over 4 and Straits Settlements over 12.

All good class Plantation rubber was in strong demand. A small lot of Biscuits from the Aberdeen estate realized 5/8½, the highest price made for this kind, and 5/7½ was obtained for a parcel from the Kumaradola estate. The best bid for Fine Crepe was 5/7¾, this being for a lot from the C. M. R. E. Co.

The highest quotation for Sheet was 5/5¾.

Other kinds also passed at fairly firm rates, except for some inferior scrap, the demand for which was not so strong, and several parcels were withdrawn from sale.

QUOTATIONS.—Fine sheet, 5/5¾.
Fine biscuits, 5/7½ to 5/8½.
Good biscuits, 5/6½.
Crepe { Fine pale, 5/7¾. Palish to darkish, 5/4¾ to 5/7¼. Dark, 4/9¼ to 4/10½.
Scrap { Fine, 4/5. Fair to medium, 4/- to 4/3. Low, 2/3.

PLANTATION FINE TO-DAY.—5/7½ to 5/8½, same period last year, 5/11 to 6/1½.

PLANTATION SCRAP.—2/3 to 4/5, same period last year, 3/8½ to 5/5¾.

FINE HARD PARA (South American).—5/2, same period last year, 5/3.

AVERAGE PRICE OF CEYLON AND STRAITS SETTLEMENTS PLANTATION RUBBER.

217 packages at 5/2¾ per lb., against 301 packages at 5/2¾ per lb. at last auction. Particulars and prices as follows :—

Ceylon.

MARK.	QUANTITY, DESCRIPTION AND PRICE PER LB.
Sirigalla	1 case good biscuits and scrap, bought in
Doranakande	4 cases darkish biscuits, bought in. 1 case dark rejected sheet, 5/3½. 6 cases good palish scrap, 4/5. 3 cases dark cuttings, 4/3½.
Waharaka	2 cases darkish biscuits, bought in. 2 cases palish pressed scrap, 4/3.
Rangbodde	1 case fine pale biscuits, 5/7½.

Mark.	Quantity, Description and Price per lb.
Ambatenne	1 case good scrap, bought in. 1 case darker and inferior, 4/-.
Tallagalla	2 cases good large darkish biscuits, bought in. 1 case pressed block scrap, 4/5.
Warriapolla	3 cases good palish biscuits, 5/6¼. 1 bag darker and inferior, 5/3¾. 1 case palish pressed block scrap, 4/6. 1 bag somewhat similar, 4/6. 1 bag rejected biscuits, 4/6.
Glencorse	1 case good scrap, bought in.
Dolahena	2 cases darkish cut sheet, 5/3½, 1 case thick rejections, 4/-. 1 bag cut block scrap, 4/6.
Ambatenne	3 cases inferior scrap, 2/3.
Tallagalla	2 cases very inferior scrap, bought in.
Aberdeen	1 case good pale biscuits, 5/8½. 2 cases somewhat similar, 5/5. 1 case little inferior, 5/5. 1 case darkish pressed scrap, 4/5¾.
Clontarf	1 case darkish crepe, bought in.
Kumbukkan	1 case palish to darkish biscuits, bought in. 1 case somewhat similar, bought in. 1 case rejections, 4/1½. 1 case heated scrap, bought in. 1 case darkish scrap, bought in.
Kumaradola	2 cases good palish biscuits, 5/8.
Elston	2 cases inferior biscuits, bought in.
Langsland	12 cases good palish biscuits, 5/6¼. 1 case lump scrap, 4/1½. 1 case darkish scrap and rejections, 4/4½.
Arapolakanda	9 cases fine darkish biscuits, 5/6½. 1 case fine palish biscuits, 5/6. 2 cases pressed block scrap, 4/3. 1 case black pressed block scrap, 4/2.
Ellakande	1 case palish to darkish biscuits, 5/4¼. 2 cases good pale biscuits, 5/7¾. 1 case darkish pressed crepe, 4/10½.
R S R	4 cases fine palish cut sheet, 5/4.

STRAITS SETTLEMENTS.

Mark.	Quantity, Description and Price per lb.
CMRE Ld.	4 cases fine pale crepe, 5/7¾. 13 cases palish to darkish crepe, 5/7¼. 7 cases darkish crepe, bought in.
R3	4 cases good palish sheet, 5/5½.
BS BILA L* * * do D* * *	7 cases good palish sheet, bought in.
Bila	1 case darkish sheet, 5/4¼.
	1 case dark pressed block scrap, bought in. 1 case palish pressed block scrap, bought in. 1 case rejected biscuits, bought in.
	3 cases small palish sheet, bought in. 1 case large rejected biscuits, 5/6. 4 cases dark sheet, bought in. 3 cases rejected sheet, bought in. 1 case palish sheet, 4/6.
	1 case palish pressed scrap, bought in. 1 case cut rejected biscuits, bought in. 1 case darkish pressed scrap, 4/2½.
	4 cases palish to darkish scored sheet, bought in. 2 cases darkish rejected biscuits and sheet, bought in. 2 cases palish to darkish sheet, bought in. 2 cases inferior, bought in. 2 cases palish sheet and biscuits ,bought in. 3 cases somewhat similar, bought in. 1 case large palish to darkish biscuits, 5/6. 1 case darkish crepe, bought in. 1 case dark crepe, 4/3.
F J R	3 cases block scrap, bought in.
Sungei Krudda	4 cases good palish sheet, 5/5. 2 cases darkish rejected sheet, 4/0½. 1 case good pressed scrap, 4/4. 2 cases inferior, 4/3.
B R R Co. Ltd.	20 cases good palish scored sheet, 5/5½ to 5/5¾. 4 cases palish crepe, 5/3. 10 cases darker and inferior, 5/1¼. 2 cases dark, 4/9¼. 4 cases somewhat similar, 4/9¾.

SSBRCo.Ld.	4 cases fine large palish sheet, bought in. 4 cases good palish scrap, bought in. 3 cases thick rejections, 4/3. 1 bag fine pale scrap, bought in.
VR&Co Klang FMS	23 cases good small palish scored sheet, 5/5½. 3 cases good palish pressed crepe, 5/4¼. 9 cases darker, 4/11½.
S R Co. Ltd	7 cases fine small palish sheet, 5/5. 1 case palish pressed crepe, 5/4¾. 1 case darker, 5/3¾. 1 case somewhat similar, 4/9½. 2 cases darkish pressed crepe, 4/9½.
K P Co Ltd.	5 cases palish cloudy sheet 5/4¼. 2 cases palish pressed scrap, 4/3. 4 cases small palish to darkish cut sheet, 5/4. 1 case large palish biscuits and cut sheet, 5/2½. 1 case thick scrappy rejections, bought in. 1 case palish pressed scrap, 4/4¾.
KM P R	1 case palish rejected sheet, 5/1½.

Java.

Calorama E H	3 cases scrap, bought in. 1 case similar, 3/-. 1 case heated scrap, bought in.

GOW, WILSON & STANTON, LIMITED— India Rubber Market Report.

13, Rood Lane, London, E. C.

December, 18*th* 1906.

At to-day's auction, 346 packages of Ceylon and Straits Settlements Plantation grown rubber were under offer, of which about 300 were sold. The total weight amounted to about 23½ tons, Ceylon contributing over 9 and Straits Settlements over 14½.

In consequence of the near approach of the Christmas holidays, the auction was held to-day instead of on Friday the 21st inst.

There was good active competition, generally fully up to rates current last sale.

Medium to good scrap was in strong demand, and prices for this description showed a slightly upward tendency. Crepe Biscuits and Sheet sold steadily.

Some pale Crepe from C.M.R.E. Ltd. and Culloden brought 5/8 per lb., and some fine Ceylon biscuits from Culloden realized 5/7¼ per lb., the highest price, while 5/6¾ was the top figure for Sheet.

Quotations.—Fine sheet, 5/6¾.
Fine biscuits, 5/7 to 5/7¼.
Good biscuits, 5/6½.
Crepe { Fine pale, 5/8.
Palish to darkish, 5/4¾ to 5/7¼.
Dark, 4/10 to 5/-.

Scrap { Fine, 4/5.
Fair to medium, 4/- to 4/4.
Low, 1/11.

PLANTATION FINE TO-DAY.—5/6¾ to 5/7½, same period last year, 6/0¾ to 6/1½.

Do. SCRAP—1/11 to 4/5, same period last year, 3/4 to 5/3½.

FINE HARD PARA (South American).—5/2, same period last year, 5/4¾

AVERAGE PRICE OF CEYLON AND STRAITS SETTLEMENTS PLANTATION RUBBER.

300 packages at 5/3¼ per lb., against 217 packages at 5/2¾ per lb. at last auction.

Particulars and prices as follows :—

Ceylon.

MARK.	QUANTITY, DESCRIPTION AND PRICE PER LB.
Hapugastenne	4 cases fine pressed worm, bought in. 2 cases darkish pressed scrap, bought in.
Ingoya	2 cases fine large palish biscuits, 5/6½. 6 cases smaller, somewhat similar, 5/6½. 1 case darkish pressed scrap, 4/4¾. 1 case somewhat similar, 4/4¾ 1 case good palish block, bought in.
Ellakande	1 case fine pale and palish to darkish biscuits, 5/7. 1 case dark and slightly heated, 5/6½ 1 case darkish pressed crepe, 5/-.
Culloden	6 cases nice pale biscuits, 5/7 to 5/7¼ 1 case fine pale pressed crepe, 5/8. 1 case little darker, 5/6¾. 9 cases darkish, 5/2¼.
Kahagalla	1 case darkish scrap, bought in. 1 case paler, 4/4. 2 cases palish to darkish scrap, 4/3½.
Katugastota	1 case palish pressed scrap, 4/4½. 1 bag pale pressed scrap, 4/4½. 1 case darkish scrap, 2/11¼.
Halgolle	1 case good palish scrap, 4/4¾. 1 case darker, 4/1½. 1 bag rejections, 3/11¾.
Maddagedera	1 case darkish scrap, 4/4½
Elkadua	1 case biscuits, bought in.
CL	8 cases darkish crepe, 5/0½. 2 cases dark crepe, bought in. 10 cases palish and darkish crepe, bought in. 1 case black pressed crepe, 4/6¼. 3 cases darkish crepe, 4/11¼. 3 cases somewhat similar, 4/11¼. 2 cases darker, 4/11¾. 1 case pressed scrap, 4/4¾. 1 case pressed scrap and rejections, 4/4¾. 1 case darkish pressed scrap, 4/4¾. 1 case pressed rejected sheet, bought in. 1 case pressed scrap and rejections, 4/4¾. 2 cases dark lump scrap, 4/0½. 11 cases fine pale pressed worm, bought in. 1 bag pressed rejections, 4/0½.
Taldua	3 cases good palish to darkish biscuits, 5/6.
Warriapolla	1 case fine pale and darkish biscuits, 5/6½. 1 case good palish pressed scrap, 4/5.

STRAITS SETTLEMENTS

Mark.	QUANTITY, DESCRIPTION AND PRICE PER LB.
Highlands Estate	7 cases good darkish scored sheet, 5/5¾. 6 cases palish to darkish crepe, 5/2½. 2 cases somewhat similar, 5/3. 1 case darker, 5/2½. 4 cases dark, 4/10. 9 cases darkish, 4/11¾.
Jebong	5 cases fine large palish sheet, 5/6¾. 1 case good palish crepe, 5/3½. 1 case darker, 5/1.

Mark.	Quantity, Description and Price per lb.
V R CO. Klang FMS	4 cases good dark pressed block, 5/1¾. 2 cases somewhat similar, 5/1¾ 1 case palish, 5/0¼. 1 case somewhat similar, 5/0¼. 1 case dark, 5/0¼. 16 cases palish scored sheet, 5/6¼. 4 cases palish pressed crepe, 5/4. 3 cases darker, 5/-. 1 case dark, 4/10.
C M R E Ld.	7 cases fine pale crepe, 5/8. 14 cases good palish to darkish, 5/7¾. 7 cases dark, 5/0¼.
Beverlac	10 cases good darkish sheet, bought in. 5 cases somewhat similar, bought in. 3 cases palish scrap, 4/4½. 1 case pale scrap, 4/4¼. 1 case cut sheet, 5/3½. 1 case rejections, 4/6½. 2 cases inferior scrap, bought in.
B R R Co Ld.	20 cases good pale to darkish scored sheet, 5/6 to 5/6¼. 8 cases good palish crepe, 5/4. 1 case fine pale crepe, 5/8. 12 cases darkish crepe, 5/1½. 1 case dark crepe, 4/9¾. 3 cases somewhat similar, 4/10¼.
A A A S	5 cases good darkish sheet, 5/5¼. 4 cases somewhat similar, 5/3¼.
G F T L	2 cases good palish crepe, bought in. 1 case darker, 4/10¼.
Pataling	12 cases palish to darkish crepe, 4/11¾.
L E B C	6 cases palish to darkish crepe, 5/1¾.
L E C C	1 case darkish crepe, 4/9¼.
A	2 cases palish cut sheet, 5/6.
B	1 case darkish pressed scrap, bought in.
A	2 cases palish cut sheet, 5/6.
B	1 case darkish scrap, bought in.
A	2 cases palish cut sheet, 5/6.
B	1 case darkish scrap, bought in.
A	3 cases palish cut sheet, 5/6.
B	1 case darkish pressed scrap, bought in.
N/M	1 case palish sheet, 5/5.
C	1 bag lump scrap, 3/10¾. 1 bag dark rejected biscuits, 4/2¼.
N/M	2 cases palish rejected biscuits, 4/2¼.
Beverlac	2 cases inferior scrap, bought in. 1 case similar, bought in.
Teluk Batu	10 cases dark sheet, 5/5. 2 cases inferior, 5/4¾. 2 cases palish pressed scrap, 4/5. 1 bag dark pressed crepe, 4/-.
SP S	1 case black pressed block, 4/2¾. 1 case palish pressed block scrap, 4/5. 1 case rejected biscuits, 4/4¼.
SP	4 cases palish to darkish sheet, 5/5½. 3 cases darkish sheet, 5/5½
SP S	1 case darkish pressed scrap, bought in. 1 case rejections, bought in.

Lewis and Peat's Ceylon, Straits and Malay States Plantation Rubber Report.

9th November, 1906.

PARA	The market has been very dull since our last and not much business has been done. Fine Hard has been very quiet and only small sales of distant have been reported at 5/2¼ per lb. Near is worth 5/2 nominal.
	Soft Fine on the spot and afloat sold at 5/0¾ @ 5/1¼ per lb. Negroheads steady with sales of Cametas at 3/0¾ @ 3/1. Islands at 3/-, Manaos worth 4/1½ per lb.
PERUVIANS	A fair business done in Fine at 5/1¼ @ 5/1½, Entrefine 5/0¼, Scrappy 4/- @ 4/1½ per lb. according to quality, Slab 3/2 nominal, Ball done at 4/2 on the spot. Dec. 4/1, buyers. Jan. 4/0½ and Feb. 3/11½ sellers.
BOLIVIAN	Fine nominal at about 5/2¼ per lb.
MOLLENDO	Fine 5/- per lb., quite nominal.
PLANTATION GROWN PARA	At sale to-day 4½ tons Ceylon and 23 tons Malaya offered and the bulk sold. Biscuits and Sheets 5/5½ @ 5/7¾, Crepe No. 1 5/7¾ @ 5/8½, inferior Scrap and Chip 3/8 @ 3/3 per lb.
MEDIUM GRADES	Especially Madagascars in good supply and selling at about steady prices.
PLANTATION	Particulars of the auctions as follows:— 374 packages offered and 274 sold. Biscuits 5/5½ @ 5/7¾, Sheets 5/5½ @ 5/5¾, Crepe No. 1 5/7¾ @ 5/8½; Scrap, chip and inferior 3/8 @ 5/3.
PARA AND PERUVIAN	890 packages offered and 528 sold: Ball 3/10 @ 4/2, Virgin 4/5, inferior Negroheads 2/11 @ 3/4, Weak Fine 4/7, good Peruvian tails 3/8¾ @ 3/9¼.
MATTOGROSSO	89 packages offered and 25 sold, Virgin sheets 4/8½.
MANICOBA	208 packages offered and bought in.
MANGABEIRA	145 packages offered and bought in.
COLOMBIAN—CENTRAL AMERICAN ETC.	36 packages offered and 30 sold. Scrap 3/9 @ 4/1½, Black roll 3/11, Slab 2/10 @ 3/1¾.
MADAGASCAR	393 packages offered and 142 sold. Red Ball 4/3, Spun Ball 3/10, Pinky 3/1½ @ 3/6½, Mottled Majunga 2/9½ @ 3/3¼, Immature Ball 2/6 @ 2/8, Low Niggers 9*d*., Virgin Lump 3/9½, Brown Cake 2/7¾ @ 2/9.

MOZAMBIQUE	180 packages offered and 137 sold. Fine Red Ball 4/6¾ @ 4/8¼, Stickless sausage 4/3 @ 4/4½, Beira sausage 4/0½, Inferior Ball 1/10¼ @ 3/7¾.
NYASSA	73 bags offered and 31 sold. Good clean red Ball 4/4½ @ 4/5.
UGANDA	25 bags offered and 16 sold. Fine Plantation sheet 4/10½, Good black sheet 3/2½ @ 4/3.
CONGO	14 packages offered and bought in.
ASSAM	35 bags offered and bought in.
RANGOON	52 packages offered and bought in.
TONQUIN	44 cases offered and 2 sold. Ball Lamu character 3/5¾ @ 3/8.
BORNEO	37 cases offered and 13 sold at 1/5½ @ 2/6½.
JAVA	45 cases offered and 1 sold. Good Red slightly heated 3/7¾.
WEST INDIAN	2 cases sold. Castilloa Plantation—Sheet 4/2; Scrap slightly heated 3/11 per lb.

Lewis and Peat's Ceylon, Straits and Malay States Plantation Rubber Report.

9th November, 1906.

The following lots comprising about 4½ tons Ceylon and about 23 tons Straits and Malay States were offered at auctions to-day and sold as follows:—

Ceylon.

MARK.	QUANTITY, DESCRIPTION AND PRICE PER LB.			
Tallagalla V SO	1 case	Darkish biscuits	...	@ bought in.
K M	1 ,,	Scrap	...	,, bought in.
Taldua	2 ,,	Biscuits dull	...	,, 5/5¾
	1 ,,	Scrap	...	,, 4/6
	2 ,,	Dark scrap	...	,, 4/2½
Waharaka	2 ,,	Dark biscuits	...	,, bought in.
Culloden	6 ,,	Pale biscuits rather mouldy	...	,, 5/7¾
	2 ,,	Fine pale crepe	...	,, 5/8½
	8 ,,	Brown crepe	...	,, 5/3
	3 ,,	Chip crepe	...	,, 4/11½
Nikakotua	3 ,,	Scrap crepe	...	,, 5/-
	2 ,,	Palish and amber sheets mouldy	...	,, 5/5½
Ellakande	2 ,,	Mouldy biscuits	...	,, 5/5½
Heatherley	2 ,,	Good palish biscuits	...	,, 5/7¾
Ellakande	3 ,,	Biscuits mixed colors	...	,, 5/6½
Hatangalla	2 ,,	Palish biscuits	...	,, 5/7½
O E C	1 ,,	Brown crepe	...	,, 5/2¾

Mark.	Quantity, Description and Price per lb.			
Mahaberia	2 ,,	Pale weakish Ceara biscuits	... @	5/5½
Kumaradola	6 ,,	Fine palish biscuits	... ,,	5/6¾
	3 packages	Brown scrap	... ,,	bought in.
	2 cases	Dark scrap and cuttings	... ,,	do.
Kumbukkan	2 ,,	Biscuits mixed colors	... ,,	do.
	2 ,,	Biscuits dark	... ,,	do.
	1 ,,	Scrap barky and heated	... ,,	do.
Sirigalla	1 ,,	Biscuits mixed colors	... ,,	do.
Kahagalla	3 ,,	Fair darkish scrap	... ,,	do.
	1 ,,	Dark scrap and cuttings	... ,,	3/8¼
	4 ,,	Scrap slightly heated	... ,,	bought in.
	3 ,,	Dark scrap slightly barky	... ,,	do.
Halgolla	1 ,,	Fair scrap	... ,,	4/4¾
Maddagedera	1 ,,	Pale scrap and cuttings	... ,,	4/2

Straits and Malay States.

L E MUAR	2 cases	Good palish crepe	... ,,	5/8½
	10 ,,	Brown, black and mottled crepe	... ,,	4/10½
Teluk Batu	4 ,,	Dark rather rough sheet	... ,,	5/5¾
	5 ,,	Fair brown scrap	... ,,	4/6
	1 ,,	Black crepe	... ,,	4/8
	1 bag	Barky scrap and pieces	... ,,	3/2
S R Co. Ltd.	23 cases	Dark rolled sheet	... ,,	5/5½
	3 ,,	Thin palish crepe	... ,,	5/7½ @ 5/8
	1 ,,	Darkish crepe	... ,,	5/2
	7 ,,	Dark do.	...	4/9¾ @ 5/0¼
	7 ,,	Chip do.	...	4/5½ @ 4/9¾
K P C Ltd.	1 ,,	Amber sheets	... ,,	5/5½
	1 ,,	Rough biscuits	... ,,	5/4¾
	2 ,,	Scrap in pieces	... ,,	4/8 @ 4/8¼
	5 ,,	Brown scrap part dirty	... ,,	4/1½
	3 ,,	Rough biscuits	... ,,	5/5
	2 ,,	Good brown scrap	... ,,	4/8
PSE	11 ,,	Part fine pale sheets, part weak & mouldy	,,	/5¾
GULA	2 ,,	Scrap in sheets	... ,,	4/5 @ 4/6
Jebong	22 Cases	Large dark amber sheets, few not quite dry	,,	5/5 bid.
	8 ,,	Very fine thin pale crepe	... ,,	5/8½
	1 ,,	Chip and scrap crepe	... ,,	4/9¼
	6 ,,	Palish and mottled crepe	... ,,	5/2¾
Highlands	27 ,,	Dark rolled sheets (6 sold)	... ,,	5/5¾
,, ✡	7 ,,	Mottled crepe	... ,,	5/3
,, ✡ ✡	5 ,,	Dark crepe	... ,,	4/11¾
,, ✡✡✡	5 ,,	Brown crepe	... ,,	5/0½

Mark.	Quantity, Description and Price per lb.		
Batu Unfor	9 ,,	Rolled amber sheets, mouldy ...	@ 5/5¾ @ 5/6
	3 ,,	Dark sheets ...	,, 5/5¾
	1 ,,	Pale mottled crepe ...	,, 5/4¼
	,,	Dark do. ...	,, 5/0½
	3 ,,	Brown crepe ...	,, 5/0½
B R R Co. Ltd.	24 ,,	Dark rolled sheets ...	,, bought in.
	8 ,,	Mottled crepe (5 sold) ...	,, 5/3
	11 ,,	Dark do. ...	,, bought in.
	3 ,,	Brown do. ...	,, 4/10½
	11 ,,	Darkish and dark rolled sheet ...	,, 5/6
C M R E Ltd.	11 ,,	Pale crepe ...	,, 5/7¾ @ 5/8
	13 ,,	Pale and mottled crepe mixed ...	,, 5/6
	10 ,,	No. 1, 2 & 3 crepe mixed ...	,, 5/-
Tjidyeroek	2 ,,	Java Castilloa sheet ...	,, bought in.
W I R P S	1 ,,	West Indian Castilloa sheet ...	,, 4/2
	1 ,,	do. Castilloa scrap slightly heated	,, 3/11

Lewis and Peat's Ceylon, Straits and Malay States Plantation Rubber Report.

23rd November, 1906.

The following lots comprising about 3¾ tons Ceylon and about 21 tons Straits and Malay States were offered at auction to-day and sold as follows :—

Ceylon.

Mark.	Quantity, Description and Price per lb.			
Culloden	7 Cases	very fine pale biscuits ...	@	5/7
	7 ,,	Brownish crepe ...	,,	5/4
	1 ,,	Dark crepe ...	,,	4/11¼
Ellakande	1 ,,	Biscuits mixed colors ...	,,	5/4¾
Heatherley	1 ,,	Fine pale biscuits ...	,,	5/7
	1 ,,	Darkish crepe ...	,,	5/0¾
Culloden	2 ,,	Inferior scrap ...	,,	bought in.
Nikakotua	6 ,,	Dark amber sheets ...	,,	5/4¾ & 5/5½
Duckwari	1 ,,	Fine biscuits pale and amber ...	,,	5/6¾
Kumbukkan	,,	Inferior dirty scrap ...	,,	bought in.
M	2 ,,	Ceara pale biscuits ...	,,	bought in.
Clara	1 ,,	Rough biscuits ...	,,	5/3
Glencorse	4 ,,	Biscuits mixed colors ...	,,	5/4¼
	2 ,,	Scrap (1 sold) ...	,,	4/2½
Densworth	2 ,,	Good small dark amber biscuits	,,	5/5
Tallagalla	3 ,,	Darkish biscuits ...	,,	bought in.
	1 ,,	Scrap ...	,,	4/5½
Ambatenne	4 ,,	Pale biscuits slightly mouldy ...	,,	bought in.
	2 ,,	Scrap ...	,,	bought in.
Upper Haloya	1 ,,	Small Ceara biscuits ...	,,	bought in.
C I.	7 ,,	Scrap ...	,,	bought in.

Mark.	Quantity, Description and Price per lb.				
	2	,,	Rambong crepe	... @	4/9½
	21	,,	Chip and scrap	... ,,	bought in.
	20	,,	Scrap crepe	... ,,	bought in.
	4	,,	Chip crepe	... ,,	bought in.
	2	,,	Low scrap	... ,	bought in.
Culloden	1	,,	Scrap crepe	... ,,	5/-.
Heatherley	2	,,	Scrap crepe	... ,,	5/2
Elston	2	,,	Rather rough biscuits	... ,,	bought in.

Straits and Malay States.

Mark.			Description		Price
SP S	3	Cases	Scrap	... ,,	4/- @ 4/3½
SP	11	,,	Biscuits and sheets rather rough	,,	bought in.
	4	,,	Rolled sheets	... ,,	bought in.
	1	,,	Pale amber sheets	... ,,	bought in.
	1	,,	Scrap crepe	... ,,	4/11
	1	,,	Chip crepe	... ,,	4/9½
SP S	1	,,	Grey sheet	... ,,	bought in.
	5	,,	Scrap	... ,,	bought in.
SP	3	,,	Sheets pale	... ,,	bought in.
	7	,,	Rough sheets	... ,,	bought in.
E	8	,,	Rough sheets	... ,,	5/3 bid.
	3	,,	Scrap pieces	... ,,	4/6¼
	8	,,	Palish scrap	... ,,	4/4 @ 4/6
V R Co. Ld Klang F. M. S.	16	,,	Rolled amber sheets	... ,,	5/5¾
	2	Cases	Crepe palish	... ,,	5/3½
	8	,,	Crepe darkish	.. ,,	4/11¼
	1	,,	Dark chip	... ,,	4/9½
S R Co. Ld.	11	,,	Rolled amber s' eets	... ,,	5/5¼
	1	,	Palish crepe	... ,,	5/4¾
	1	,,	Darkish crepe	... ,,	4/10
	9	,,	Chip crepe	... ,,	4/6½
P B S B	10	,,	Large sheets	... ,,	5/5
	9	,,	Inferior scrap	... ,,	4/4
	2	,,	Scrap pieces	... ,,	4/0¼
S R Co.	2	,,	Chip crepe	... ,,	4/6
B R R Co. Ld.	26	,,	Rolled sheets	... ,,	5/5½
	5	,,	Mottled crepe	... ,,	5/4¼
	9	,,	Scrap crepe	... ,,	5/0½
	1	,,	Chip crepe	... ,,	4/8¼
	2	,,	Brown crepe	... ,,	4
	3	,,	Palish crepe	... ,,	5/5½
B N A	10	,,	Rather rough sheets	... ,,	bought in.
Beverlac	4	,,	Scrap	... ,,	4/5¼
	3	,,	Low scrap	... ,,	bought in.

Mark.			Quantity, Description and Price per lb.			
Pataling	6	,,	No. 2 crepe	...	@	5/1 bid.
T E C B	3	,,	Scrap crepe	...	,,	5/3
P S P R	1	,,	Pale crepe	...	,,	bought in.
S R Co.	1	,,	No. 2 crepe	...	,,	5/4
Beverlac	13	,,	Darkish sheets rather rough few pale	...	,,	bought in.
	6	,,	Darkish scrap	...	,,	4/4¾
	2	,,	Chip crepe	...	,,	3/11½
	3	,,	Dirty dark scrap	...	,,	bought in.
Highlands Est.	3	,,	Fine rolled sheet	...	,,	5/5½
	14	,,	Rolled amber sheet	...	,,	5/5¼
	8	,,	Mottled crepe	...	,,	5/5¾
	12	,,	Scrap crepe	...	,,	4/11½-5/0½
Batu Unfer	4	,,	Rolled sheets light and dark amber	...	,,	5/5½
	1	,,	Mottled crepe	...	,,	5/4¾
	3	,,	Scrap crepe	...	,,	5/- @ 5/0½
SSBRCoLd	3	,,	Amber sheets	...	,,	bought in.
	4	,,	Scrap fair	...	,,	bought in.
Jebong	2	,,	Chip and scrap crepe	...	,,	4/9½
L E MUAR	30	,,	Fine block (abt. 1½ tons.)	...	,,	5/9¼
	4	,,	Chip and scrap crepe	...	,,	4/11¾
MCJ	2	,,	Small dark biscuits	...	,,	5/4
	1	,,	Thick virgin biscuits	...	,,	4/3½
	1	,,	Darkish brown scrap	...	,,	4/5
	4	,,	Pale sheets	...	,,	5/5½

Lewis and Peat's Ceylon, Straits and Malay States Plantation Rubber Report.

18*th December*, 1906.

The following lots comprising about 4½ tons Ceylon and about 16 tons Straits and Malay States were offered at auction to-day and sold as follows:—

Ceylon.

Mark.			Quantity, Description and Price per lb.			
Taldua	3	Cases	darkish biscuits dull resinous	...	@	5/6
Warriapolla	1	,,	Fine pale and amber biscuits	...	,,	5/6½
	1	,,	Good scrap	...	,,	4/5
Ingoya	2	,,	Fine large palish biscuits	...	,,	5/6¼
	6	,,	Good palish biscuits	...	,,	5/6½
	2	,,	Darkish scarp	...	,,	4/4¾
	1	,,	Fine blocked biscuits	...	,,	bought in.
Ellakande	1	,,	Fine pale biscuits rather bubbly	...	,,	5/7
	1	,,	Darkish biscuits	...	,,	5/6½

Mark.	Quantity,	Description and	Price per lb.
Culloden	6 ,,	Fine pale biscuits ...	@ 5 7 & 5 7¼
	2 ,,	,, ,, crepe ...	,, 5/6¾ & 5 8
	9 ,,	Brown crepe ...	,, 5/2¼
Hapugastenne	4 ,,	Amber Worms ...	,, bought in.
	2 ,,	Scrap ...	,, do.
C L	29 ,,	Crepe mixed colors (17 sold) ...	,, 4/6¼ & 5/0½
	6 ,,	Scrap ...	,, 4/4¾
	11 ,,	Fine pale worms ...	,, 5/8 bid

Straits and Malay States.

Teluk Batu	10 Cases	Dark rough sheets ...	,, 5 5
	2 ,,	Dark sheets mouldy and not properly cured ...	,, 5/4¾
	2 ,,	Scrp ...	,, 4 5
VRCo.L Klang FMS	6 ,,	Smoked black block ...	,, 5 1¾
	2 ,,	Whitish block undried ...	,, 5/0¼
	1 ,,	Black block ...	,, 5/0¼
	16 ,,	Rolled sheets ...	,, 5/6¼
	4 ,,	Mottled crepe ...	,, 5/4
	3 ,,	Brown ,, ...	,, 5/-
	1 ,,	Black ,, ...	,, 4/10
Jebong	5 ,,	Large amber sheets ...	,, 5/6¾
	1 ,,	Mottled crepe ...	,, 5/3
	1 ,,	Dark crepe ...	,, 5/-
B R R Co Ld.	20 ,,	Pale and darkish rolled sheets ...	,, 5 6 & 5 6¼
	8 ,,	Mottled crepe ...	,, 5 4
	1 ,,	Fine pale ,, ...	,, 5/8
	12 ,,	Scrap ,, ...	,, 5 1¾
	1 ,,	Chip ,, ...	,, 4 9¼
	3 ,,	Brown chip crepe ...	,, 4 10¾
C M R E Ld.	7 ,,	Fine pale crepe ...	,, 5 8
	14 ,,	Fine pale crepe mixed little darkish	,, 5 7¾
	7 ,,	Chip and scrap crepe ...	,, 5 0¼
Beverlac	10 ,,	Dark sheets ...	,, bought in.
	5 ,,	Mixed colors ...	,, do.
	8 ,,	Scrap (6 sold) ...	,, 4/4½ & 4/6½
Kahaglla	4 ,,	Dark scrap (3 ,,) ...	,, 4/3½ & 4/4
Katugastola	3 ,,	Scrap ...	,, 4/4½
Halgolle	3 ,,	,, ...	,, 4/1½ & 4/4½
Maddagedera	1 ,,	,, ...	,, 4/4½
Highlands Estate	7 ,,	Dark amber rolled sheets ...	,, 5/5¾
	8 ,,	Scrap crepe ...	,, 5/2½ & 5/3
	1 ,,	Black ,, ...	,, 5/2½
	4 ,,	Chip ,, ...	,, 4/10
	9 ,,	Brown ,, ...	,, 4 11¾
A A A S	5 ,,	Amber sheets ...	,, 5/5¼
	4 ,,	,, part damp ...	,, 5/3¼
F G L T	2 ,,	Crepe mottled ...	,, 5/2 bid
	1 ,,	,, darkish ...	,, 4/10¼
Pataling	12 ,,	Mixed mottled and dark crepe ...	,, 4 11¾
L E B	6 ,,	,, ,, ,, ...	,, 5 1½
L E C	1 ,,	Dark crepe ...	,, 4/9¼
A	9	Sheets mixed colors ...	,, 5/6
B	4 ,,	Scrap ...	,, bought in.
C	1 ,,	,, ...	,, 3 10¾ & 4 2¼

To-day's price of Fine Para 5 1¾ per lb.

AGRICULTURAL BULLETIN

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AND

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CONCERNING THE MEDICAL MANAGEMENT OF COOLIES IN MALAYA

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D.T.M.H., CANTAB., L.M., ETC., ETC.

With an Appendix of Plans and Estimates

BY W. A. WILKINSON, A.M.I.C.E.

Whilst the cry of "Rubber! Rubber! and large profits!" resounds throughout Ceylon and the Straits and is wafted abroad from these countries, may I be permitted, in the interest of both the capitalist and the coolie, to draw the attention of employers of labour to a few points which seem to me to affect the future of the industry; certainly in this country, and probably in every country wherein a large amount of labour is employed.

Firstly, then, I would point out that all the wealth in the world will not profit a man broken down in health.

Secondly, that a dead or broken down coolie is of no practical use on any estate.

Thirdly, that unless due precautions be taken, both these lamentable eventualities are at least liable to occur, and indeed, as far as I have seen of the conditions under which the immigrant lives after importation to this country as an agricultural labourer, the failure of the coolie is quite probable.

As it is my purpose to deal principally with the conditions of life of the coolie—the pawn upon whom the question of profits must to a large extent depend—it will probably be sufficient advice in dealing with my first point if I say to managers and assistants:—

> Build your houses on open, elevated, long-cleared land if possible, let them face the prevailing wind, that you may obtain the full benefit of the evening coolness; do not lie about in wet clothes; sleep under a mosquito net; eat and drink moderately; work hard, but don't overdo it unless absolute necessity demands; Take every reasonable opportunity of getting away from the Estate—especially up an hill—and when you get "played out" or really "seedy" look to it at once.

Remember that malaria, bowel-complaints, and severe colds, are serious diseases, and if undealt with frequently leave sequelæ which neither money nor science can deal with.

Lastly, wear flannel if you can.

There are four fundamental necessities for the establishment of healthy coolie lines:—

1. A pure water supply.
2. Adequate ventilation.
3. Some inexpensive but efficient system of Sanitation in and around the lines.
4. Sound drainage.

With regard to number 1, if the well system be adopted of necessity, then remember that the "circle of influence" is at least 20 yards, and that sewage contamination has been traced to upwards of one mile, if the lines are permanent the wells should be bricked inside and surrounded by a raised coping and a cemented and graded circle of say ten feet from the coping all round, the water used for bathing or otherwise spilt should be run off to a distance, the well should be covered, and all water drawn by a pump.

A simple method of testing whether a well is contaminated by sewage in its vicinity is to pour a solution of fluorescin into the nearest drain or cesspit and observe whether any fluorescence occurs in the well water after 24 hours.

All well and river water is the better for a passage through *a clean* dripstone filter, but these filters when used casually without cleaning are a danger rather than a method of purification. They should be periodically boiled and scraped, as fungi are able to grow through

their interstices and thus to contaminate good water, the water, if any serious doubt exists about its purity, should be boiled, and stored in some clean place where dust cannot fall into it; the tank or jar must be covered.

Speaking generally the deeper the well the better, and if any hard stratum exist in hills in the vicinity, artesian water may perhaps be struck at a reasonable depth.

Pure streams from the hills are probably the soundest water in this country, aqueducts of bamboo are cheap, and can be made over long distances satisfactorily. Always inspect the catchment area.

All the rivers of this country are polluted to some degree, and if river water is the only possible source of supply it *must be* filtered and boiled. That portion of the river near the lines should be divided into three parts: (1) An upper reach for the drinking and cooking water; (2) A middle reach for watering cattle; (3) A lower reach for washing.

If rain water is the only source of supply it should be stored in large underground tanks as at Gibraltar and other unfortunately situated stations.

All tanks and wells should be protected from the entrance of surface flood water, unless the surface over which the water flows is above reproach, if, on the addition of 4 ozs. of permanganate of potash to an ordinary-sized well, the water does not become and remain pink for about an hour, the water must be looked upon as doubtful, and measures should be taken to further purify it or to have it analysed. The permanganate should be mixed in a bucket before being poured into the well.

2. Ventilation. The question of ventilation involves little extra expense, as obviously the less we place between ourselves and "God's good fresh air" the less it will cost us in houses, and yet the better we shall be, the present Kuchi is wrong in principle—by the present Kuchi I mean the one which has a straight attaped back, a short roof behind and a longer roof in front, under which is a verandah where cooking, etc., is performed—its chief mistakes are:—

(*a.*) The roof is not high enough as a rule.

(*b.*) There is not sufficient ventilation above nor below, in front nor behind the cubicles or sleeping rooms.

(*c.*) The verandahs, being also kitchens, frequently are the receptacle for all sorts of rubbish.

After mature consideration and ample proof of its benefits I now believe that there is but one ideal type of lines which is advisable in the best interests of both employer and coolie, namely the lines which consist of a simple roof on supports, under which the cubicles are built.

none of the line partitions are over nine feet high, all cubicle floors are 3 ft. 6 ins. from the ground and *open underneath.* (Plans of this and other hygienic lines are attached).

Of about 15 estates with which I am familiar, the healthiest is one on which the above type of lines are in occupation, and I believe I am correct when I state that the only type of disease which has affected that estate of recent years, has been epidemic in character, and introduced from without. As, however, on many estates the old-fashioned type of lines have been erected, I would suggest that they be altered as soon as possible, by the removal of the upper two layers of side attaps, and the removal of the attaps which extend to the ground (and so close the space under the benches), and that they be replaced as soon as possible by one of the type suggested. (Appendix plans).

An excessive height off the ground is almost as obnoxious as excessive proximity to the earth, because if the lines are too high the underneath will be used as a hen-house or store, in all human probability.

Of the two forms of ventilation—the overhead and the underneath —the latter is perhaps the more to be insisted upon as we know that animal CO_2 gas as exhaled, is most poisonous, and also that its specific gravity is greater than air, therefore, in the absence of draughts by under ventilation, it is obviously only a matter of time and opportunity to become suffocated by it.

We now come to the question of *Sanitation at the lines.* Everyone who has had anything to do with the Tamil coolie is aware of his roaming habits under certain circumstances, his love of variety and the fields, or preferably the road or pathway, but that Tamil coolies or Chinese coolies or any other coolies cannot be gently but firmly educated I absolutely decline to believe!

Now, under existing Sanitary—perhaps I might indeed say insanitary—arrangements on the majority of estates in this country, I submit that the unfortunate coolie who gets "a tummyache" at say 1 a.m., should not be blamed by the inspecting doctor or agent the next day, in the garish sunlight, for filthy habits, in other words "*until proper sanitary accommodation becomes a feature of every coolie lines in the country and a special coolie be detailed to look after the matter, disease must continue to exist amongst the whole class.*"

The type of latrine to be erected is of the simplest, an attap-roofed shed elevated above the surrounding ground level, with a trench for buckets or to be filled in with a mixture of dry earth and lime daily to a depth of about three inches, the trench protected from storm-water by means of ordinary earth drains around it, and sufficiently removed in its situation from the main water supply to prevent contamination—this will suffice to prevent an enormous amount of illness. I attach some plans of suitable buildings.

Lines are generally, in my opinion, better without any open earth drains whatever, they only serve as receptacles for all sorts of filth and rubbish. The very fact of a convenient hole to throw things into running all round the lines, is quite sufficient inducement to create a bad habit amongst a much higher type of individual than the average coolie. My ideal surrounding for lines would be short-cropped grass, gravel, laterite, or coarse ashes, not very expensive luxuries any of them. I would run French drains at right angles, from the kuchis right round, in order to keep the immediate vicinity dry. Pools, if they occurred after rain, should be filled in or levelled. (French drains are made by digging first a graded trench, filling in the whole length of it with coarse rubble, then over this fill in finer gravel, then sand or earth, and cover the whole with earth, gravel, or grass. Some sinking will, of course, occur, which must be dealt with, but the result is an enormous and cheap improvement.)

Brick drains round lines are, of course, charming, but they must be carefully graded and *capable of dealing with all flood-water*, kept clean by frequent sweeping and disinfection, and, where they run deep, weep holes to carry off surface water should be made.

Tidal drains, whether of earth or brick, unless properly controlled by water gates are in my opinion inadvisable. If thoroughly under control and regularly opened and the drains swept with the ebbing of the tide they may be made use of.

If the watergates are opened at high tide and closed until low water then opened and the drains flushed out at a high velocity, with much sweeping, twice a week, then good results may be expected.

Too much stress cannot be laid upon the system of facilitating all sanitariness amongst coolies, at present they are blamed as a class—I believe quite wrongfully—for being dirty in their habits and altogether bestial, they have no opportunity of being otherwise unless the European places every convenience within their reach.

Let a sanitary mandor be appointed to every 100 coolies, erect a latrine for every seventy-five individuals, punish defaulters, inform your coolies of the arrangements, post notices for those who can read, and I shall deem it a personal favour if you will let me know the result at the end of six months.

System must be the password, and every drainage and sanitary plan should be capable of extension to meet larger demands.

Principal Diseases of the Coolie.

For obvious reasons it would be improper of me to write a full description of the methods of treatment and diagnosis of disease in this paper, and it would be quite impossible to do so within the limits of an ordinary essay, but in the interests of both parties I may perhaps

sketch briefly the principal symptoms which lead one to suspect serious disease, and suggest a sound amateur treatment to be adopted in such cases.

Malarial Fever.

The principal disease to which the coolie is liable is Malarial Fever, but if the attacks of this disease remain discrete—by which I mean so long as the attacks are separated by a day or days—one may safely deal with him on the estate by the administration of quinine in 5 gr. doses thrice daily, if, however, the attacks overlap, and the disease becomes continuous, then an hospital is the proper place for the case. When it is found that the fever yields to quinine the drug should be continued in 5 gr. doses daily for two (2) months, the neglect of this most important "regime of prophylaxis" is the cause of the relapse cases which cause so much invaliding and disturbance of estate work quite unnecessarily.

The necessity of sleeping in mosquito curtains must be "rubbed into" coolies; the Chinese have adopted them and there is absolutely no reason why the Tamil should not be educated up to their use. At the meeting of the Malaya Branch of the British Medical Association held at Ipoh on August 28th and 29th, 1906, my friend Dr. MALCOLM WATSON of Klang, pointed out the advisability of mosquito-proofing all lines, and he laid before that meeting most convincing statistics to show that the saving of life and labour from the ravages of malaria by this means, amply repaid planters for their original outlay on wire gauze. I am strongly in favour of this measure where it is feasible, but curtains must be supplied where serious obstacles to its adoption exist.

In dealing with the question of fever the mosquito naturally comes under notice, and before starting upon the means to be adopted to combat the existence of this pest, I must first make my peace with some planters who still believe that this insect is not the only means of propagation of malaria, by stating that the malarial parasite has been constantly found in the stomachs of certain mosquitos, but it has not been found in decomposing granite, nor in any of the other earths and clays, etc., which have been blamed as distributors or propagators of the disease. All experiments with infected Anopheles have been positive, and I am quite willing to guarantee or gamble on the result of the experiment of infecting any new-comer to this country by the means of infected Anopheles, provided the doubting planter will make the necessary arrangements with his newly-arrived assistant.

Mosquito houses were the only means adopted by the Commission sent out by the London School of Tropical Medicine to that hotbed of malaria the Roman Campagna, and no cases occurred amongst the members of the expedition, and again, the European who submitted himself to the bites of Anopheles which were infected 48 hours

previously in Rome, still occasionally gets fever (Mr. WARREN, assistant in the London Tropical School who had an attack while I was studying there).

Of oils and paints to keep off the mosquito there are many, amongst others I can state from personal experiment that citronelle oil kills two species of Anopheles at least, within 30 minutes, and *if renewed* about every three hours upon exposed surfaces, it effectually keeps them away. Antikito cream is well advertised, but I have no personal knowledge of its efficacy; it can be obtained from the Antikito Syndicate, 6 Great Portland Street, London.

Anti-mosquito measures generally speaking consist in: 1. Closing all ponds; 2. Draining all swamps; 3. Covering all necessary water; 4. Kerosining all large stagnant areas of water; 5. Clearing the banks of all slow-flowing streams and drains, and to the above I would add from my own experience the felling of secondary jungle, and the cutting of lallang in the vicinity of houses.

In connection with malaria it must not be supposed that a rigor (shivering fit) a hot stage, and a heavy sweat, comprise the whole of the disease, as it has been definitely proved that malarial dysentery, and diarrhœa occurs frequently in the tropics, and that the whole question as to what symptoms malaria shows is dependent upon the particular organ, or part of the body in which sporulation of the parasite occurs, should sporulation take place in the brain, convulsions and coma will be present, in the lungs a form of pneumonia, in the intestines a form of dysentery, etc. Malaria is not the simple kindly disposed disease which planters frequently imagine.

Dysentery.

I do not intend to deal exhaustively with this question, but I wish to impress the fact that I believe the vast majority of dysentery cases, as seen amongst coolies, have their origin either in malaria, or are of a bacillary nature and highly infectious, the impossibility of separating the two forms, from a layman's point of view, render a general rule necessary, that rule is: *Segregate all dysentery cases.*

Bilharziosis, when it affects the rectum produces symptoms similar to dysentery, it is known, but uncommon here.

If the health of an estate is a matter of any importance, each dysentery case should be looked upon as if it were cholera, and isolated immediately on its appearance.

As a routine treatment a dose of castor-oil, with say 20 drops of chlorodyne, is the safest medicine to start on, and on arrival in hospital I am a believer in enemata of various drugs according to the predominating symptoms.

Diarrhœa.

Diarrhoea causes a large mortality and invaliding rate amongst coolies. I consider it to be chiefly due to one of four causes: 1. Mica in their drinking water; 2. Eating uncooked rice; 3. Malaria; 4. Ptomaine poisoning, by which we understand the eating of food which has commenced to decompose. (Quite recently I met a coolie homeward bound with a species of ray which was quite bad, and I have no doubt that his intention was to share it with his family, I confiscated the fish and got a conviction against the vendor.)

As ptomaine poisoning diarrhœa is difficult of diagnosis, and the protraction of the illness very variable, and as it may be confused with other diseases (which I shall deal with below) I think that these cases ought to be segregated, many of them might be tubercular or typhoidal in nature. The necessity of regular inspections of the food in the estate shop is a fairly obvious duty and will help to prevent the ptomaine cases if all questionable articles are confiscated and destroyed.

Anchylostomiasis.

This disease, of which little is as yet known amongst laymen, has been of late years so threshed out pathologically, that it is now, to the tropical physician, an open book, writ large, and easy of diagnosis microscopically. This scourge of the West Indian planter at one time, will be one of the most serious diseases to be dealt with in this country, unless prompt precautions are taken with regard to its prevention and cure in such places as it now occurs.

The disease in its fully developed stage exhibits the following symptoms: anæmia, swelling, diarrhœa, abdominal pains, muscular pains or pains in the joints, and a lassitude, which may be remarked frequently as the first symptom.

The disease untreated invariably terminates fatally, but if the treatment be applied in time it is not very difficult to deal with, and the patient usually recovers. It is due to the action of a minute worm which lives in the upper part of the small intestine and sucks blood from the patient, eventually causing a deep anæmia or wateriness of the blood, which is followed by the symptoms enumerated above. The gravity of the disease is proportional to the number of worms present in the intestine.

The parasite can enter the system either by the mouth in drinking water, or by the skin, and it works havoc amongst coolies in infected areas.

The worm can live in moist earth for a considerable time, and many authorities believe that it can multiply outside the body.

The ova of the worm are voided in large numbers by sufferers from the disease and then undergo development into worms capable of infecting persons through the skin.

When the almost total absence of latrine accommodation for coolies is considered, together with the habits of the Tamil, and the fact that they work barefooted, the chance of a worm gaining admission into a human being must be regarded as "rosy."

The treatment, consisting as it does in the administration of a somewhat dangerous drug—namely, thymol—I do not intend to deal with herein, but it may be useful to hospital dressers to remember that the drug is soluable in the following: chloroform, oils, turpentine, alcohol, glycerine, and Ether (a useful pneumonic for these drugs is cotage), if they be administered to patients when thymol has been exhibited poisoning follows.

The prophylaxis of the disease is simple, but extremely difficult—if I may be permitted the bull, simple because it consists in either compelling coolies to wear shoes and gaiters or putties when at work, or in smearing their legs with some sticky substance, before they go to work—in the West Indies the planters, driven to extreme straits, eventually stamped out the disease by insisting upon the coolies stepping into green Stockholm tar before going to work. I believe any thick oily substance will serve the purpose, the prophylaxis is difficult, because it is obviously a tedious process to prove to the native mind that such simple measures are necessary and effective for the preservation of their health. Latrines and a lines watchman are absolutely necessary to see that sanitary instructions are followed.

Debility.

One of the principal headings of disease under which a multitude of diseases are in reality included, it is a serious cause of invaliding and stoppage of work.

That there exist cases which are not easily relegated to their proper heading I am, alas! only to ready to grant, but that in the majority of instances these cases *can* be separated I am equally convinced. Amongst others, the following diseases are, I consider, largely responsible for "debility": 1. Anchylostomiasis; 2. Dum-Dum fever (which undoubtedly exists amongst Indian coolies in this country); 3. Worms; 4. Starvation (due to improperly cooked food which cannot be digested): 5. Sprue; 6. Malaria in a vicarious form.

Such cases cannot be separated without careful examination and scientific investigation, and the hospital is their proper place. The number of coolies who die annually of "debility" is at present much too high in estate hospitals, and to my mind reflects upon the class of dressers employed usually in estate hospitals, and also reflects detrimentally upon the planter, and upon the revenue of the country.

Ulcers.

That these cases which cause such an enormous number of hospital-birds, and "slackers" amongst labour forces here, can be dealt with by similar methods to those quoted by me above for

Anchylostomiasis, I have no doubt. The cause lies beyond question hidden in one word, *wounds*, whether caused by biting flies, the Anchylostoma, sugar-cane leaves, stoney ground, or what not, the original cause of ulcer amongst coolies is, I believe, a wound, and the method of their prevention is quite obvious.

The admissions for this disease in Krian district during 1905 amounted to 5,322 in a total labour force of approximately 7,200, and if the average number of days for which each case was in hospital be put at say 10, the total monetary loss to the estates must have been about $14,000. During 1906, 3,617 cases were returned on a labour force of 7,135.

Dum-Dum Fever.

This disease undoubtedly does occur in imported Indians, but that it can arise or ever has arisen *de novo* in this country, is not certain.

As I have already stated it may be confused with Anchylostomiasis, and some other debilitating diseases, the diagnosis can only be made microscopically, and considerable skill is necessary in the preparation of the specimen.

There is as yet no known cure for the disease.

The disease has also been called Kala-Azar.

The principal symptoms will be anæmia, swelling, weakness, enlargement of the spleen and liver, and great general debility.

The cases must, of course, be sent to hospital, if only to have the diagnosis made.

Bilharzia Disease.

Endemic in Africa, this disease has happily not invaded this country to any extent.

The symptoms affect either the bladder or the rectum, causing in either position a discharge of blood and mucus.

It may be confounded with dysentery when affecting the latter.

The accurate diagnosis can only be made microscopically and no first aid treatment is likely to be necessary.

In the event of severe bladder pain occurring, the general treatment of inflammation of that organ (irrespective of the cause), namely, a hot hip bath, and barley water to drink, should be kept in mind.

The disease is caused through bad drinking water.

Worms.

Many natives harbour intestinal parasites, the commonest being the round worm.

Tape worms occur but rarely in my experience, but of whip-worms the same cannot be said.

Intestinal worms cause a marked amount of debility and frequently anæmia also.

The treatment of the tape worm is frequently a protracted procedure, as the head of the worm is not easy of expulsion, the treatment is ext. of male fern, or thymol, both of which drugs require careful handling.

The round worm is expelled by santonin, which drug—although it may cause yellow vision—should occupy in this country a position more akin to that occupied by quinine than it at present holds.

Despite the arbitrariness of the statement, I am of opinion that every coolie arriving in poor condition should have an ounce of castor oil on the day of his arrival, and 6 grains of santonin next morning. The question of the psychological moment for the administration of the drug, I leave to the intelligence of managers or hospital assistants; the ideal method would be to treat the whole batch at once.

Whip worms will require injections for their removal and as they cause no actual invaliding do not cause any material effect upon the work of the estate. Filtration of or boiling of the drinking water is the proper preventive of these diseases.

Elephantiasis, Chyluria and Varicose Glands.

The cause of all the above diseases which occur, but are not common in this country, is a blood worm.

The worm is transmitted by the bite of Culex mosquitoes so that our anti-malarial measures will help to prevent the diseases.

Elephantiasis is diagnosed by the swelling of a part, usually a leg or a foot, the swelling is hard and brawny, the skin usually wrinkled, and very coarse, the disease is usually uni-lateral and the affected part does not pit on pressure.

Chyluria, due to the Filaria also, consists in a milkiness of the urine.

Varicose glands usually occur in the groin, they are hard and painless.

All these diseases can only be diagnosed microscopically in their early stages and have little effect upon health until long established.

The majority of cases require the scalpel for their treatment.

Leprosy.

Unusual amongst coolies who have been medically examined, it is, nevertheless, most important that the symptoms of this disease should receive all possible publicity, in the interests of the public health.

Any thickening of the skin, circumscribed, and of a coppery red tinge, should be suspected.

Loss of feeling, even to sharp bodies, such as a pin, if it is found in a hardened patch of skin is very suspicious. Thickening of the nerves, for example an enlargement and hardness of the nerve at the inside of the elbow—"the funny-bone"—should lead one to examine for anæsthetic patches elsewhere.

Chronic ulcers of the feet particularly of the sole of the foot, are frequently leprous.

The physiognomy of a leper is quite distinctive to the trained eye, and when the seared, leonine expression is present, cannot be mistaken.

Irregular and usually slight attacks of fever occur early in leprosy, the later signs, such as the loss of fingers and toes and repulsive ulcerations of the body, are, mercifully, seldom seen save in the asylums provided for these unfortunate beings.

Abscess of the Liver.

The fever, emaciation and general illness preceding the full development of this disease are so variable and progressive, that its diagnosis is hardly a subject for this pamphlet.

Early operation is the secret of success, and all that I need mention about it will be a quotation from Sir PATRICK MANSON'S lectures at the London School of Tropical Medicine: "Whenever you find a progressive deterioration of health and vigour occurring, accompanied by some fever and sweats, always suspect liver abscess."

Sprue.

I feel that a précis of sprue is a difficult task. Where tropical diarrhœa ends and sprue begins is not easy of definition, but if I were driven to a descriptive epigram, I would say, "sprue is a chronic deterioration of mucous membranes of unknown causation."

The symptoms may be represented by various combinations of or a conglomeration of the following:—

Diarrhoea, sore tongue, ulceration of the mouth, abdominal pains, pain on swallowing, pale stools, gassy stools, loss of weight and energy, shrinkage of the liver. I consider sprue to be common amongst coolies in this country, but the difficulty of accurate diagnosis. causes the majority of the cases to be returned as diarrhœa.

The treatment, which should be commenced very early, consists in baby-foods and milk, nourishing unseasoned dishes, such as freshly cooked minced chicken, fresh fish, eggs, rusks, and such like. I believe that if this treatment were adopted on the first appearance of symptoms of tropical diarrhœa or sore mouth, that many cases would not progress to the acute disease.

I may perhaps be pardoned for having digressed somewhat, and in some instances for having invaded the domain of the manager's illnesses rather than the coolies—as in the case of the treatment given above—but I submit that on such occasions if I have outlined the proper treatment for the manager he can easily substitute for what is laid down as his treatment, what should be the treatment for his coolie sick of the same disease.

Infectious Diseases.

I have already laid down the advisability of isolating cases of dysentery, diarrhoea, anchylostomiasis, and other intestinal diseases, the necessity in infectious cases—strictly such—is absolute, and if it be remembered that in the case of cholera alone, the disease frequently commences as a simple diarrhœa, the expediency is obvious. Of epidemic disease affecting bodies of coolies the principal will, of course, be small-pox, cholera, chicken-pox, influenza, measels, dengue, plague, to a minor extent enteric fever, and amongst the Chinese beri-beri (which is perhaps not directly infectious). The majority of these diseases can be seen coming, and arrangements made for the isolation of the cases directly they occur, the estate should establish quarantine against infected areas in the vicinity, and every endeavour should be made to prevent coolies visiting such infected areas.

Small-pox.

The incubation of the disease is about 13 days, during this time the patient feels quite well.

Fever starts with shivering, and sweating, and frequently vomiting, children often have convulsions, pain in the back is severe. On the 3rd day of fever the eruption appears, in appearance like pimples, and with a shotty, hard feel to the touch.

The pimples next suppurate and matter forms, this period marks the commencement of the secondary fever, and occurs about the 8th day, the eruption appears on the head and neck first, gradually spreading. The secondary fever is severe, and about the 14th day the patient becomes most offensive, and may be quite unrecognisable. Delay in the appearance of the eruption is a favourable sign. The rash comes out all at once, in contradistinction to chicken-pox which occurs in crops.

The infection lasts until all the crusts have fallen. Careful disinfection of the hands, and of all material which has come in contact with the patient is imperative.

Attendants upon the sick should be chosen from amongst those who have already had the disease, or who have good vaccination marks. Strict quarantine for 14 days after the death or complete recovery of the last case is necessary.

The best form of isolation hospital—and the cheapest—is a shed of ataps, bound to iron supports, the floor should be cemented if possible, and the "whole show" burnt when the epidemic is at an end.

Chicken-pox.

The rash comes out on the first day of the fever, all the symptoms are less severe than small-pox, and the eruption comes out in crops. The feel of the pimples is not so hard as those of small-pox. Suppuration occurs in the pimples just as in small-pox, but the two diseases are really unlikely to be confused.

Plague.

Perhaps the first remark to be made upon this disease to the layman is, that there need not necessarily be any buboes, and indeed the most serious cases show no external sign of the terrible affection, as is now well known the form from which the disease obtained its name was the bubonic form, in which swellings of the glands in various parts of the body do exist (groins, neck, armpits) this form of the disease—given the fact that cases have been occurring in the neighbourhood—is at least easy to suspect, and the extreme depression and very acute fever, lead one to isolate the case promptly, but the cases which I wish to put you on your guard against are, the *pneumonic* and the *septiæcmic* forms, these occur with some frequency in all epidemics, and I think that perhaps the safest dictum I can give you as a working and standing order is this, "isolate all cases of high "fever which is accompained by marked depression, or giddiness, or "constant cough," and try not to mistake a plague case for a drunken coolie, the symptoms frequently resemble each other, but the severe fever must settle the diagnosis for you.

The diagnosis should be confirmed microscopically by Dr. BELL'S method (Hong-Kong).

The incubation is laid down at three to eight days, but instances in which infection has occurred from clothing, and after months, have been observed. Initial symptoms are shivering followed by severe fever, headache, vomiting, unsteady gait, depression, enlargement of some of the glands (if of the bubonic type).

Little children usually succumb.

Plague patients are infectious for about one month after recovery.

Rats are known to disseminate plague.

Infection may take place through wounds and scratches, and also through the bites of insects, e.g., rat-fleas, bugs, and perhaps mosquitos.

The excreta and sputum are infective.

Attendants upon plague cases should wear shoes.

Thorough disinfection of all clothing (if it be not possible to burn it) is imperative.

An anti-rat crusade is advisable early in the epidemic.

Quarantine should extend to ten days unless the medical officer relaxes this rule for good reasons.

Cyllin is said to be the best disinfectant.

Haftkines plague serum has been variously reported upon.

Cholera.

Frequently commences as a simple painless diarrhœa, but may start very suddenly during the night, the diagnosis—in the event of cholera existing in the vicinity—of all cases of diarrhœa, must be guarded, and when under such circumstances, such cases occur, isolation, prompt and efficient is strongly to be recommended.

The next stage is one of collapse from which many cases never recover, the motions at this period become like rice-water, cramps occur, and no doubt about the diagnosis usually remains, more especially if the disease has been reported from the nearest town or village.

The vehicles of infection are, water, milk, and contaminated food, and clothing.

I found, however, when dealing with the disease in Pahang in the year 1901, that a grave suspicion fell upon the river fish, and whether "post hoc" or "propter hoc" the disease certainly abated rapidly when I got the "kathis" to place the river fish under a "pantang," thus preventing their use as food.

During the stage of collapse stimulants are indicated by the mouth (if retained) and by hypodermic medication, the application of heat, mustard plasters and such like remedies also.

Contact with the discharges must be avoided, and disinfection carried out thoroughly if such contact occur.

The vomited material, the urine, and saliva are infective, and of course the motions.

The most prompt isolation of all diarrhœa cases in the event of cholera being present in the district is necessary.

If possible, change the water supply at once, examine the food supply and milk supply, and destroy all articles of doubtful virtue (except human beings) on the estate or works at once.

Vomiting is usually severe in cholera cases and is usually a pale watery fluid. The appearance of a cholera patient is most typical, the hollows round the eyes, the dazed or hunted appearance, taken together with loss of voice, coldness of the extremities, a feeble pulse, deep collapse, and the macerated appearance of the hands all lead one rapidly to the correct diagnosis.

All wells should be submitted to the permanganate process (see above) which is highly praised, but I personally prefer to rely upon boiling.

Corpses should—failing burning—be buried with chloride of lime. Perhaps the best and simplest drugs to administer in the first instance are castor oil, chlorodyne, and brandy (half an ounce of the oil, 25 drops of the chlorodyne, and about one ounce of brandy). Eucalyptus oil has lately been highly spoken of, I have myself found a strongly carminative mixture containing liq. hydrarg. perchlor. a most useful mixture. Colomel acted well in the Krian epidemic, gr. 1 every hour, but I consider it requires careful watching. Haffkines cholera vaccine should be given a trial, it has been well spoken of.

Quarantine infected houses, lines, and towns.

The most satisfactory method of dealing with infected houses is of course to burn them, if impracticable, then disinfect them thoroughly with 1-500 corrosive sublimate. During the Pahang epidemic the D.O. (Mr. Mason) and I, burnt every house in which a case occurred which was within two miles of Raub town, and I believe that action had much to do with the fact that Raub remained clear.

All excreta must be either burnt or buried.

Contacts must be also isolated, and they should all be given some acid mixture thrice daily in order to keep the stomach acid.

Measures to be taken upon the Outbreak of Cholera, Plague, or Small-pox.

1. Form bearer, burial, and sanitary companies, equip with stretchers, etc., treat all as contacts, their clothes and hands to be carefully rinsed in 1 in 500 corrosive twice daily and after contact.

2. On the discovery of a case, bearer company will remove patient to hospital, medical officer will remain to see the kuchie opened to the sunlight, and the room either completely limewashed or scrubbed with 1 in 500 corrosive sublimate.

3. When the washing gang are started the names of the contacts should be taken, they should be sent to the contact shed. Frequent roll calls of contacts are essential.

4. During the progress of 2 and 3 above, the patient's clothes may be burnt, all his utensils destroyed or boiled.

5. If the disease shows any tendency to spread, tubs of 1 in 500 corrosive, 1 to each 50 coolies must be set up and the clothes of everyone in the lines steeped therein for 12 hours.

6. All utensils of all coolies must be boiled.

7. All wells must be closed, and a sound, fresh water supply arranged for (this in the case of cholera only).

8. All coolies must rinse their hands in a solution of 1 in 1,000 corrosive before meals.

9. Change the bathing places if possible.

10. Limewash or corrosive wash all benches in the kuchies.

11. In the case of small-pox universal vaccination.

12. In the case of plague, plague vaccination and disinfection as above.

Dengue.

This disease is an exceedingly sudden, and extremely infectious fever, it is marked by severe pain in the bones and joints, a rash usually appears, but in this country is rather fickle in its appearance, in the early stage of the fever it occurs as a simple redness of the general body surface, which is hard to demonstrate on dark skins. The pain in the joints and bones is frequently very serious, and the disease has hence acquired the name of "break-bone" fever. It almost invariably occurs in epidemic form, and rapidly spreads, it may be "seen coming" and advances from the neighbouring towns rapidly, when it has once declared itself.

After the primary fever a short interval of calm or freedom from fever occurs, and patients may even feel fit to go to work, but the secondary fever then breaks out, and a rash the true rash of dengue shows up, this commences on the palms and backs of the hands, is best seen on the back of the body to which it quickly spreads. It consists of slightly elevated, circular, reddish brown, spots, about half an inch in diameter, which eventually coalesce to form plates of red.

Peeling occurs, and may last for some time (2 to 3 weeks). Isolation of the first cases is advisable, but the disease spreads so rapidly that it were advisable not to expect too much of isolation as a preventive measure in this disease.

Influenza.

As the vast majority of us have had personal experience of this disease, I shall merely draw attention to the leading symptoms once more to remind those who have suffered of their miserable time, and to claim kindness, or at least consideration, for coolies who become affected by it; sneezing, cold in the head with fever, pain in the back, rheumatic pains all over, general miserableness. Quinine and salicylate of soda are useful drugs in the disease, but it must notbe trifled with nor neglected.

Measles.

The rash comes out on the fourth day of fever, it is well defined, and the "running at the eyes" usually helps to diagnosis, exposure must be avoided, as pneumonia is a rather frequent complication.

Measles, influenza, and dengue are easily confused, but if the planter will look about him he will frequently find assistance from the fact of certain diseases existing in the vicinity.

Phthisis.

Consumption is an *infectious* disease. Consumption is terribly common in this country. The disease is insidious, and occurs in many forms, affections of the lungs being perhaps the most common, but the disease when it attacks the intestines is very fatal. The internal organs are susceptible, and I have ample post-mortem proofs of its frequent occurrence here in this situation. Careful examination of coolies suffering from chronic cough is most advisable, and the examination should be carried out microscopically in order that no mistake can arise. In the future Government will, I have no doubt, erect consumption sanitaria, but for the present I consider that when a coolie is found to be suffering from this dread disease, that he should be immediately repatriated, as the cheapest and best method of preserving the health of those who must associate with him in his work and on the lines while in this country.

Hydrophobia.

A word or two about this shocking disease may not come amiss here. The disease is caused by the contact of the saliva of a rabid animal with a wound on another animal (man included).

It usually occurs as the result of the bite of any animal suffering from rabies.

The first symptoms of the disease in the dog (which is the commonest domestic animal affected) are: 1. A change in temperament; 2. Restlessness.

The stages of the disease have been divided as follows:—

1. The premonitory or melancholic.
2. The irritative or maniacal.
3. The paralytic.

In the first, as I have stated, the dog's general behaviour alters, if a lively individual usually, he becomes morose, inclined to snap, and to hide himself, as this stage progresses he is often observed to chew sticks, to eat pieces of stone, etc.

He then becomes "mad," symptoms of choking, spasms, or fits, take place, panting, difficulty of breathing, vomiting, and cough occur, he may run away from home, and sometimes they travel great distances, at this stage the diagnosis is generally easily made.

The last stage is paralysis, his jaw drops, he can no longer swallow, his back becomes paralysed, and the unfortunate animal dies, either in a convulsion or quite suddenly.

The measures to be taken if one be bitten, or a wound of the skin come in contact with the saliva of such an animal, are: 1. Apply a tight

ligature above the seat of the bite if possible; 2. Burn the bite itself with a hot iron; 3. Apply carbolic acid. The ligation should be retained in position for about three hours. The incubation period from the bite or contact, to the development of hydrophobia is variable, but may be set down at from 4 weeks to 16.

Suspected dogs and other animals should be firmly tied up and kept under observation, or they may be killed by shooting them in the head, their spinal cord or a portion of it removed, placed in a bottle containing glycerin, and sent to the nearest laboratory to be examined as to the exact diagnosis.

All uncared for animals should be shot for an area of about 10 miles round the focus of the disease.

In the unfortunate event of one being bitten by an animal doubtfully mad, the patient should be sent to Saigon or one of the Indian Pasteur Institutes, with a piece of the spinal cord of the animal which bit him, for confirmation of the fact of madness, and, if confirmed, for treatment. The reason for taking the cord is that some animals show very rapidly the effect of the poison, and the disease can be with certainty diagnosed by injecting them, and treatment rapidly started.

Hospitals.

Under the Labour Code which deals practically exclusively with Chinese, sec. 79 lays down "that the resident may order an hospital to be built, and a dresser engaged provided not less than 50 labourers be employed."

Under the Indian Immigration Enactment Rules, "Hospital accomodation of eight beds for every 100, is required, they should be under the charge of a resident and qualified apothecary." The demensions, floor-space, etc., are all laid down, it will therefore suffice if I express my fixed opinion that the appointment of a qualified resident apothecary is most advisable in every hospital in this country if good work is to be done on estates.

I have seen every class in charge of the sick I think, and the more I see of the estates which endeavour to economise on their medical department, the more convinced am I that it is folly of the most superior brand.

I much regret that I have yet to meet the dresser, on $30 to $50 a month, who is dependable for a diagnosis; returns one can obtain galore! but they wither under the light of day.

The differential diagnosis between say malarial cachexia, and Bright's disease, and anchylostomiasis (with which you are now I trust familiar) are of the utmost import to the future of an estate; and again, the separation of plague from venereal bubo with fever, small-pox from chicken-pox, typhoid from a simple diarrhœa, and cholera from ptomaine poisoning, and a host of similar cases which may require prompt recognition, must surely prove my point, that the dearer article is the cheaper!

In my opinion the most important point in dealing with the health of estates and large works is the *instant separation* of the sick from the healthy. No sick coolie should remain one minute in contact with his sound fellows, certainly not one hour, and to leave him one day is criminal!

With the able assistance of Mr. WILKINSON—both of us I may mention working under difficulties—I introduced on the Krian Irrigation Works a system of prompt segregation of the sick, with a view to stamping out the infectious dysentery which played havoc amongst the coolies for a time. The method adopted was: At each lines we established a small isolation shed of from four to ten beds, if any coolie complained of dysentry, or diarrhœa he was immediately sent to the shed, the furniture consisted of beds, chamber-pots, blankets, tinned milk, and cups, an attendant had charge, and all motions were kept for inspection by a dresser or the medical officer.

The system which was directed against dysentry would work equally well in other cases, and malingerers, diarrhœa, and typhoid cases could be "spotted" with some approach to accuracy. If the system be carried a step farther it becomes applicable to all forms of disease, all that is necessary being a shed with partitions for those who complain of different diseases.

Please do not mistake me when I speak of these diagnosis sheds, they are not intended to be expensive hospitals, but rather filters for the hospital, and merely resting places as substitutes for the lines in the case of any coolie becoming sick of any disease which is prevalent or dangerous to his fellows, they are very valuable in cases of malingering also.

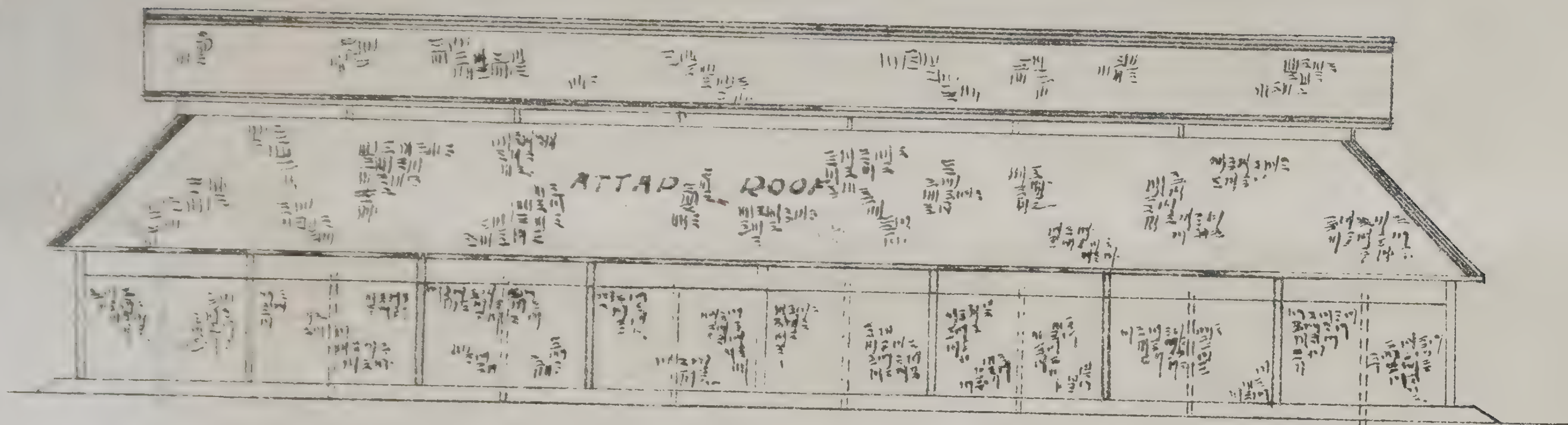
There are no doubt many points which I have missed in this essay, but as I am not yet sufficiently educated in planting to see things from a manager's point of view, I shall deem it a great favour if any planters who observe the omission of important items from their point of view, will communicate with me direct to Kuala Lumpor, I shall be most happy to discuss any matter which concerns the welfare of the coolie in Malaya.

My earnest thanks are due to Mr. W. A. WILKINSON, whose valuable assistance in converting my plans from an amateur chaos, into workmanlike drawings I cannot over-estimate, that they will be of service in establishing a sanitary uniformity in Malaya I sincerely trust.

To Mr. RIDLEY and to Mr. CARRUTHERS I am indebted for this special edition of this journal without which I could not have gone to print. I need hardly say that I am very deeply obliged to them, but if the planters find anything of useful instruction in this essay, the planters thanks will be a more fitting reward for my benefactors than anything I could write here.

P. N. GERRARD.

SEMI-PERMANENT COOLY-LINES
No 2. ATTAP
SCALE 1/16 INCH TO ONE FOOT.



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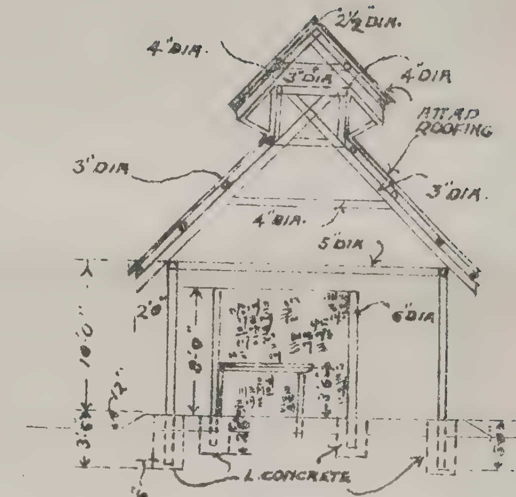

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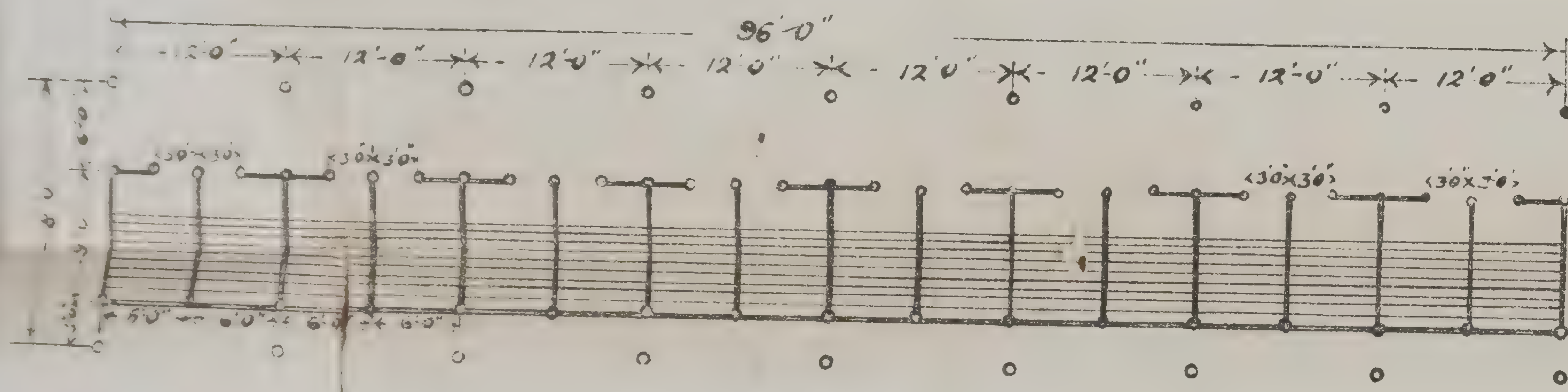
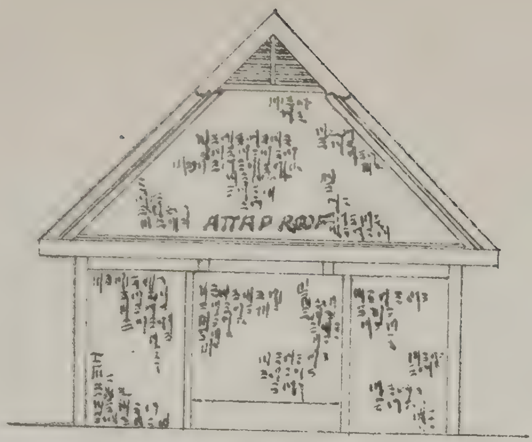


PLAN

PARTICULARS	CONTENTS	RATE	$	Cts
EXCAVATION	6 2/3 c.yd	-/20	1	35
CONCRETE	8 1/3 "	7/50	61	07
EARTH FLOOR	90 2/3 "	-/25	22	66
POST 6" DIAR.	405 L.F.	-/06	24	30
DO 4 "	216 "	-/03	6	48
DO 3 "	440 "	-/02½	11	00
ATTAP WALLS	2760 sq.ft	-/05	138	00
WALLPLATES 5" DIAR.	232 L.FT	-/04½	10	44
DO 4" "	174 L.F.	-/03	5	22
BED BOARD 1" "	576 sq.ft	-/10	57	60
WEATHER BOARDING	15 Do	-/07½	1	13
RAFTER 5" DIAR.	863 L.F.	-/05	43	15
DO 4" Do	323 L.F.	-/03	9	69
COLLAR 4" DIAR.	342 "	-/03	10	26
Do 3" Do	85½ "	-/02½	2	13
PURLIN 3" DIAR.	725 "	-/02½	18	12
DO 2½ Do	435 "	-/02½	10	87
ATTAP ROOFING	3383 S.F.	-/05	194	40
			627	85

Lithographed at the Surveyor General's Office Singapore November 96



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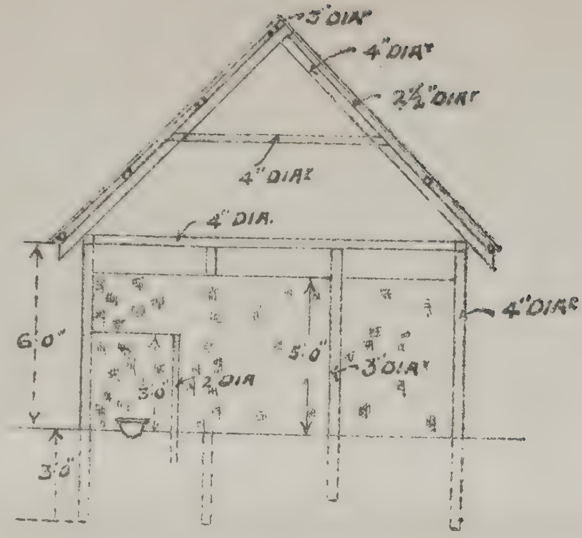

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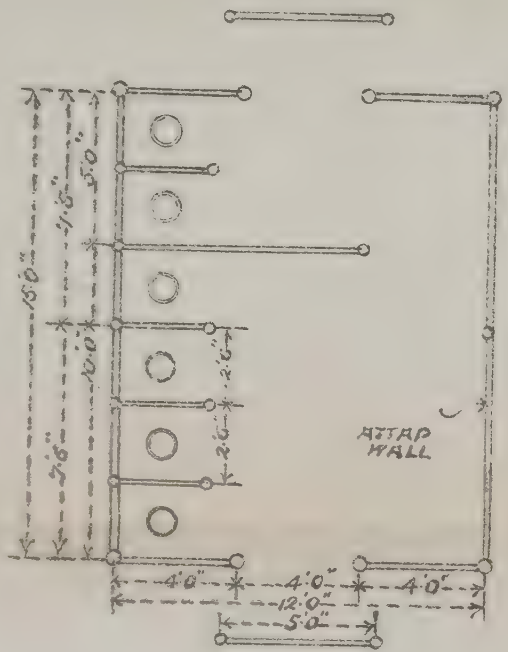


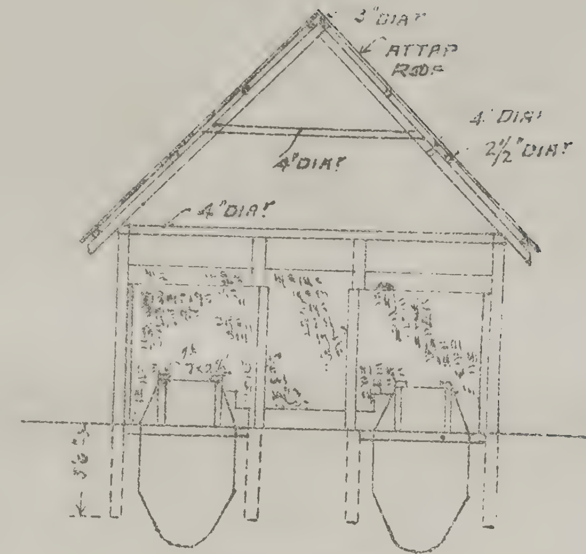
PLAN

PARTICULARS	CONTENTS	RATES	$	CTS
EXCAVATIONS	1½ C.Y.	-/20		30
POSTS, WALLPLATES, ETC 4" DIA.	144 L.F.	-/03	4	32
POSTS 3" DIA.	67 L.F.	-/2½ "	1	67
ATTAP WALLS	346 Sq. Ft	-/05	17	30
ATTAP ROOF ARCO	375 "	-/05	18	75
RAFTERS, COLARS, ETC 4" DIA.	185 L.F.	-/03	5	55
PURLINS 2½" DIA.	134 "	-/02	2	68
HARDWOOD Sq. TIMBER	2 C.F.	-/90	1	80
WEATHER BOARDING	65 S.F.	-/07½	4	87
EARTHENWARE BUCKETS	6	-/20	1	20
			58	44

Lithographed at the Surveyor General's Office Singapore November 06

LATRINE No. 2 (EARTH & LIME)
SCALE 8 FEET TO ONE INCH

ELEVATION



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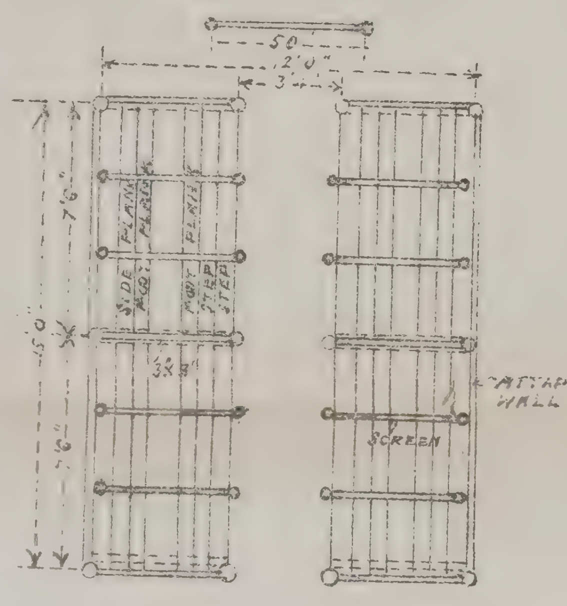
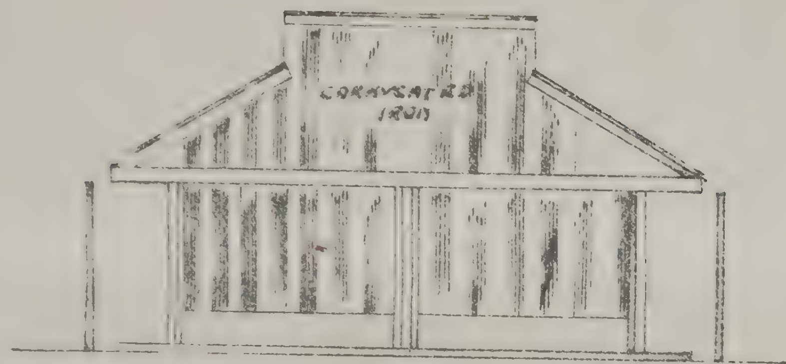


PLAN

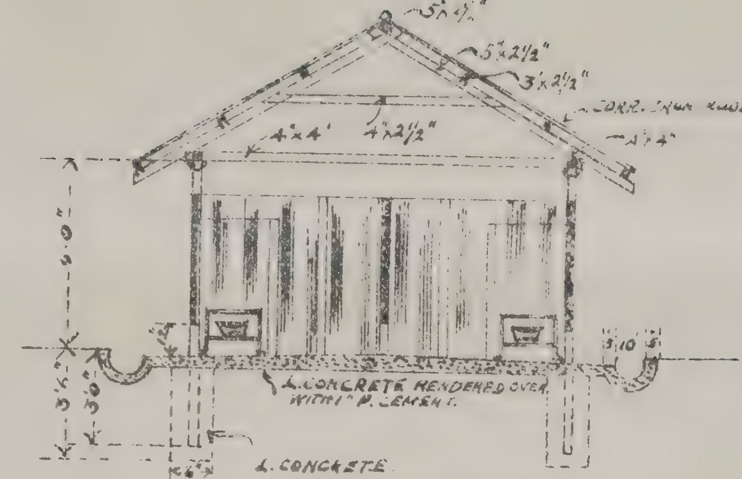
PARTICULARS	CONTENTS	RATES	$	C
EXCAVATIONS	11½ C.Y.	7/20	2	30
POSTS, WALLPLATES ETC. 4"DIA	144 L.F.	-/03	4	32
POTS 3'DIA.		-/02½	3	30
HARDWOOD BEAMS ETC.	13 C.F.	7/98	11	70
RISERS, TREADS, SIDE PLANKS ETC.	54 S.F.	-/07	3	78
ATTAP WALLS	413 S.F.	-/05	20	90
ROOF ARCO	375 S.F.	-/05	18	75
RAFTERS, COLARS ETC. 4"DIA.	185 L.F.	-/03	5	55
PURLINS 2½" DIA	134 "	-/02	2	68
WEATHER BOARDING	63 S.F.	-/07½	4	72
			78	00

Lithographed at the Surveyor General's Office Singapore November 06

PERMANENT LATRINE
SCALE 8 FEET TO AN INCH



SIDE ELEVATION



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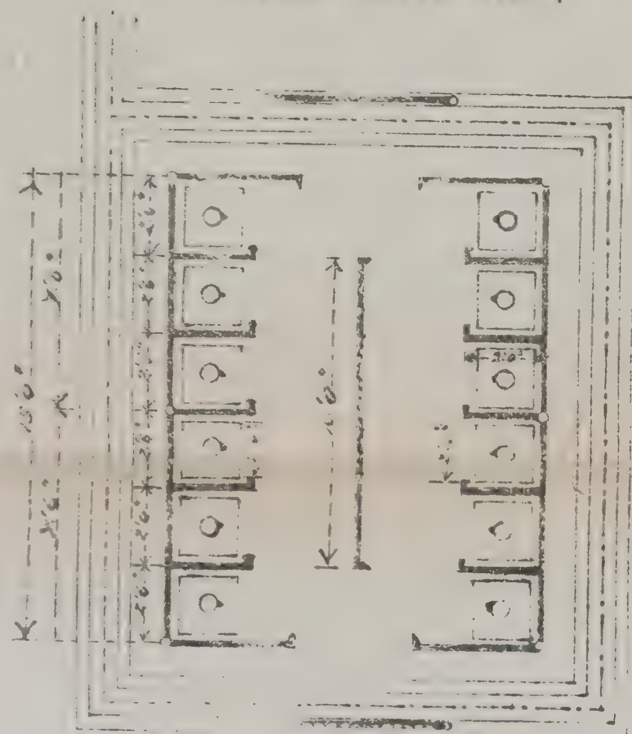


PLAN

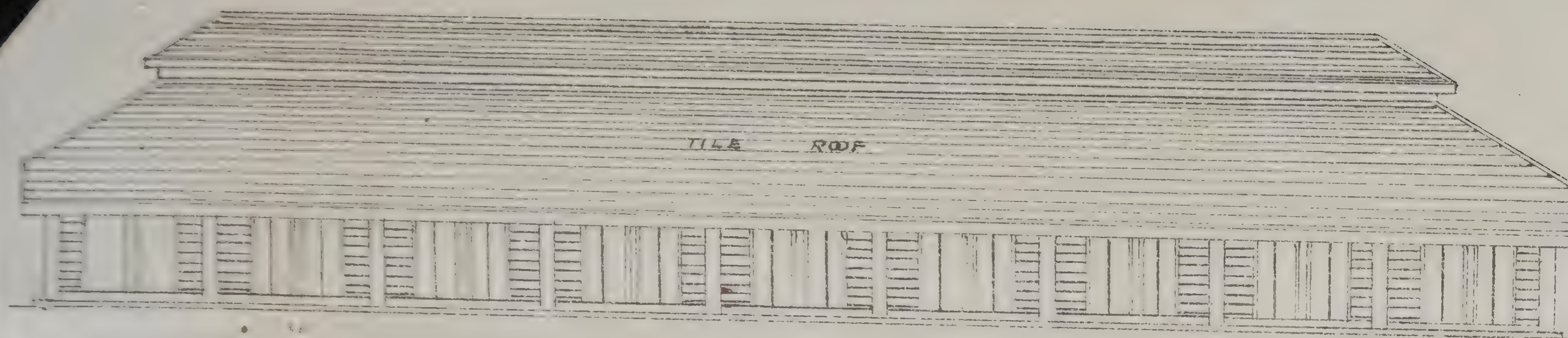
PARTICULARS	CONTENTS	RATE	$	CTS
EXCAVATION	7 C.Y.	-/20	1	40
HARDWOOD TIMBER	32⅔ C.F.	-/90	29	40
CONCRETE FLOOR	83½ C.F.	-/27	22	54
3/4" CEMENT RENDERING	[illegible] S.F.	-/08	20	09
CONCRETE DRAIN	73 L.F.	-/40	29	20
AREA OF CORR: IRON ROOFING	353¼ S.F.	-/16	56	52
ANGLE IRON 2"x2"x⅜"	208 L.F.	-/54	112	32
FLAT IRON 2" WIDE ½" THICK	10 "	-/36	3	60
* IRON PILLAR FILLED WITH CONCRETE 4" DIAR	64 "	6/-	36	00
DO - DO - DO - 3 "	28	5.50	17	11
COR' IRON WALLING	415 S.F.	-/15	62	25
IRON COMMODES	12	7/-	84	00
IRON BUCKETS	12	-/65	7	80
WEATHERBOARDING	63	-/7½	4	72
			486	94

* 9FT LONG TUBES EACH $6.00

Lithographed at the Surveyor General's Office Singapore November 08.

PERMANENT COOLY-LINES

SCALE 1/16" TO ONE FOOT



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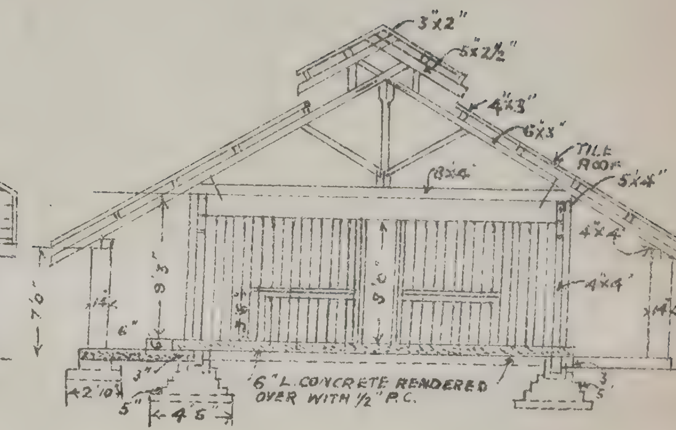

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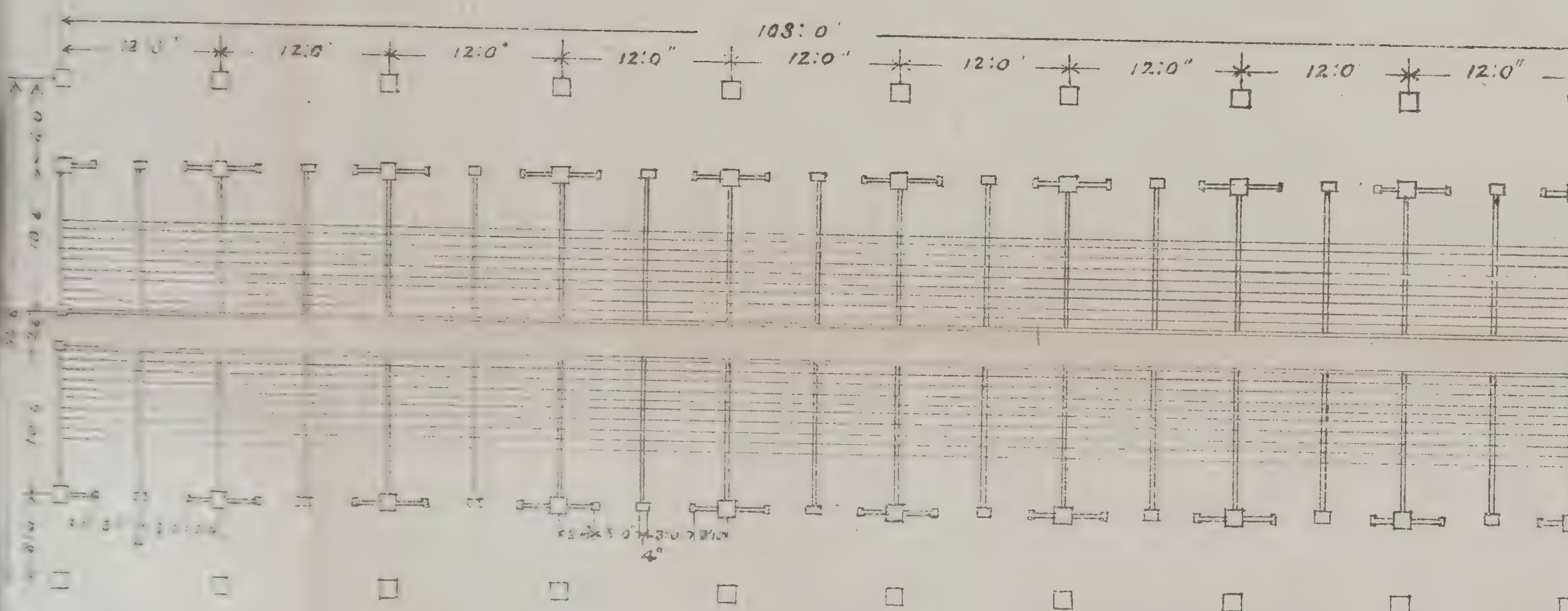


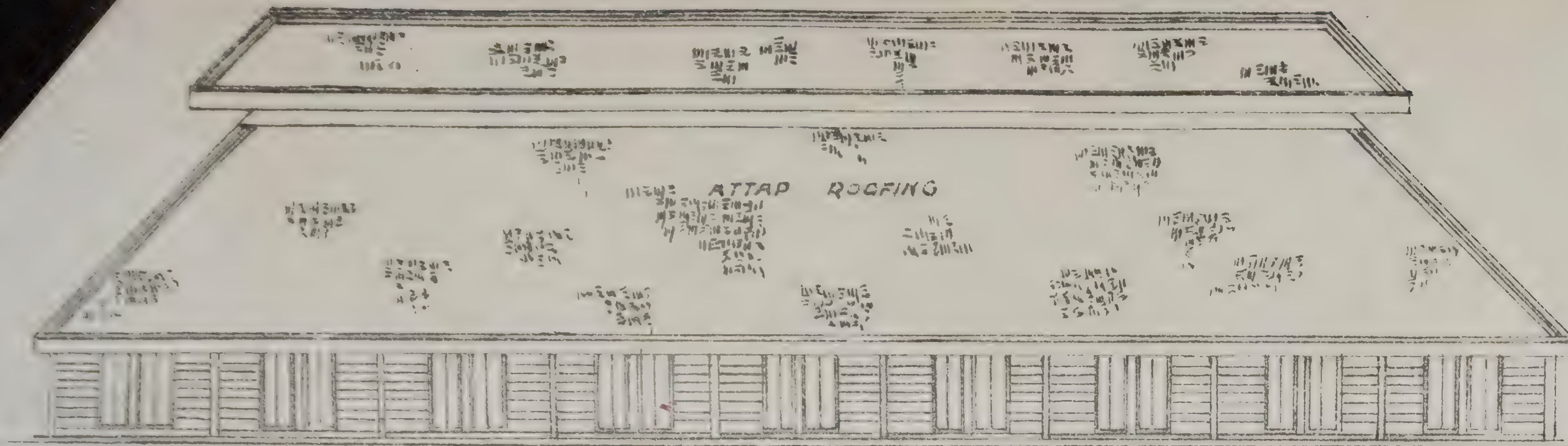
PLAN

PARTICULARS	CONTENTS	RATES	$	CTS
EXCAVATION	44¼ C.Y.	-/20	8	85
EARTH FILLING	47 "	-/25	11	75
LIME CONCRETE IN FOUNDATION	288 C.FT	-/27	77	76
BRICKWORK	510 "	-/35	178	50
6" L. CONCRETE FLOOR WITH ½" P.C. RENDERING	3924 Sq.FT	-/18	706	32
HARDWOOD POST	25 C.FT	-/90	22	50
PARTITION	5415 Sq.FT	-/09	487	62
DOORS	378 " "	-/25	94	50
BED BOARDS	1404 " "	-/10	140	40
HARDWOOD, BEAMS, WALLPLATES, RAFTERS ETC	489 C.F.	-/90	440	10
TILES	5256 Sq.F	-/17	893	52
THREE WAY. STRAPS 1¾" x ⅜"	28	-/60	16	80
STIRRUP STRAP 1¾" x ⅜"	19	-/50	9	50
STRAP 1¾" x ⅜"	28	-/50	14	00
			3102	12

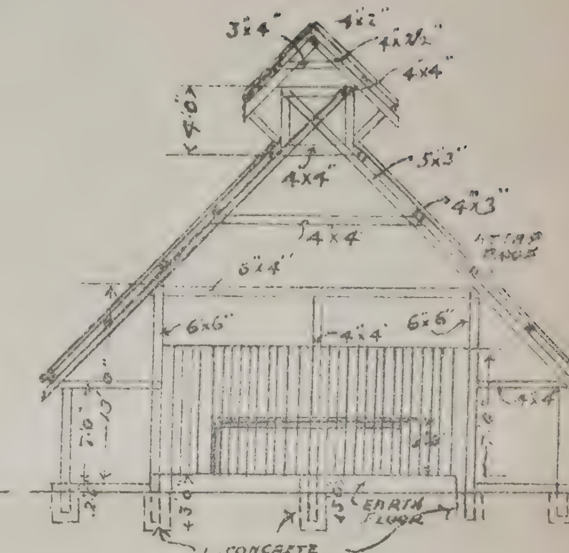
Lithographed at the Surveyor General's Office Singapore November 06

SEMI-PERMANENT COOLY-LINES

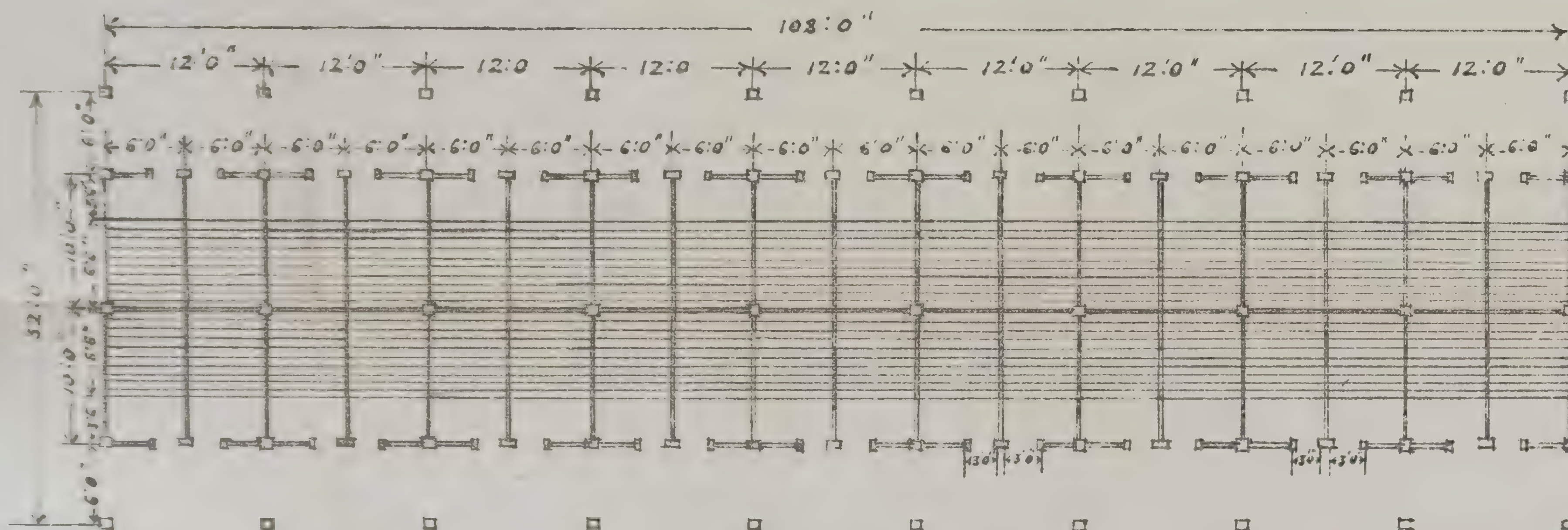
SCALE OF 1/16 INCH TO A FOOT



ELEVATION



SECTION

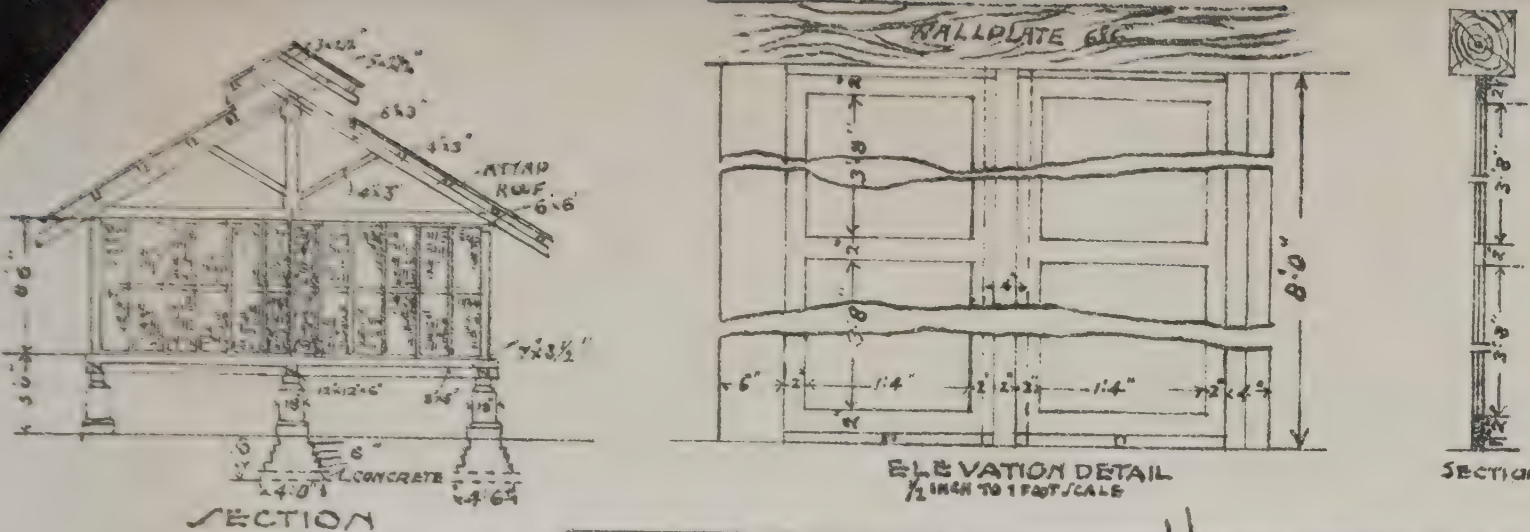


PLAN

PARTICULARS	CONTENTS	RATE	$	C^{ts}
EXCAVATION	6½ C.Y.	-/20	1	30
LIME CONCRETE	5¾ "	7/50	43	12
EARTH FLOOR	113	-/25	25	25
POST	12¼ C.FT	-/90	12	05
PLANK PARTITION	3685 S.FT	-/09	331	92
DOOR	756 "	-/25	189	00
BED BOARD 1" THICK	1404 "	-/10	140	40
WALL PLATES	167 "	-/90	150	30
RAFTERS	189 C.FT	-/90	170	10
COLAR	55 "	-/90	49	50
PURLIN	96 "	-/38	36	48
ATTAP ROOFING	5968 Sq.FT	-/05	298	40
			1680	74

Lithographed at the Surveyor General's Office Singapore November 98

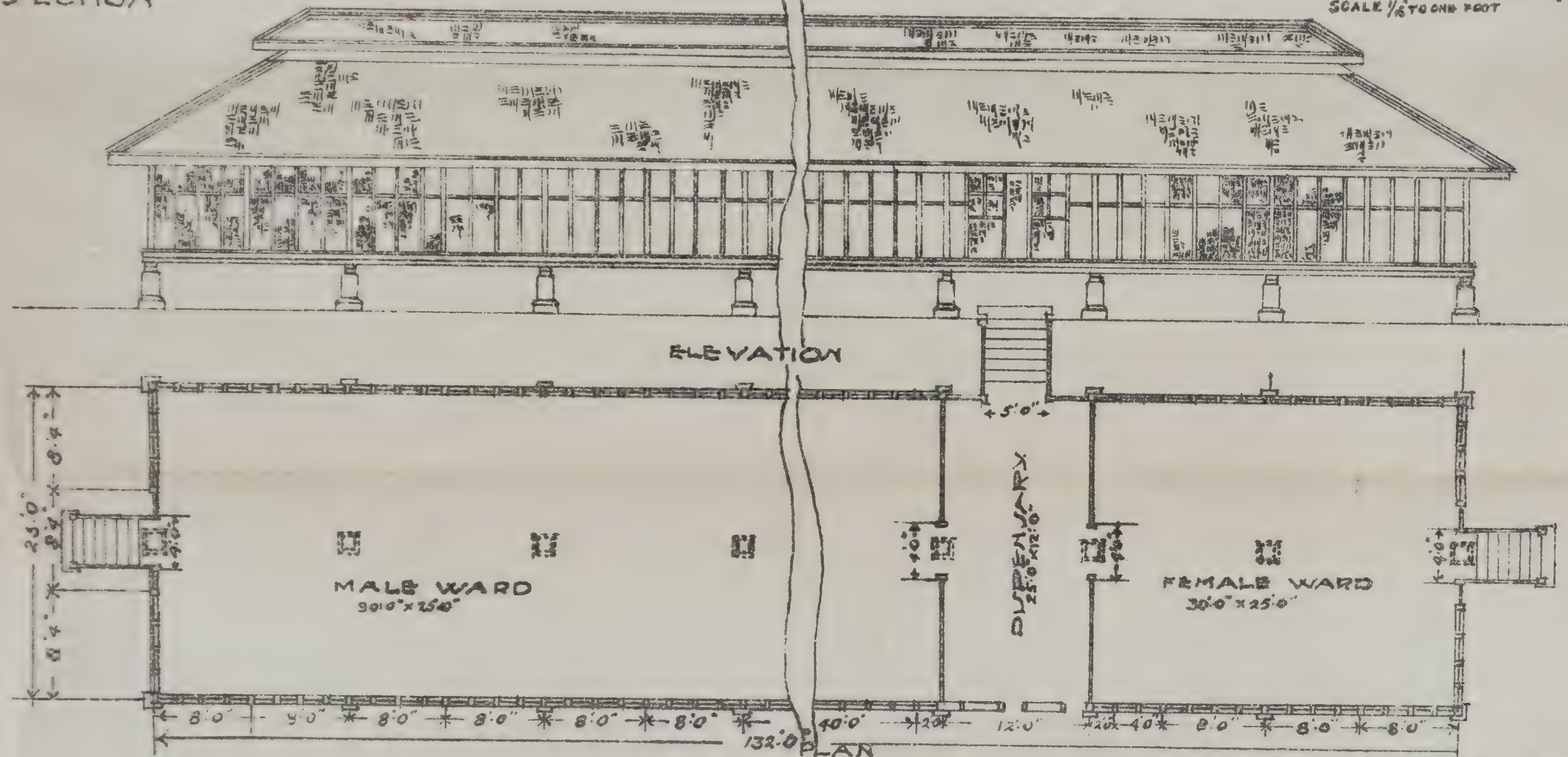
Lithographed at the Surveyor General's Office Singapore November 98



PARTICULARS	CONTENTS	RATE	$
EXCAVATION	36¾ C.Y.	/28	4
L.CONCRETE IN FOUNDATION	282 C.F.	/27	76
BRICKWORK	697 "	/35	243
HARDWOOD POST	666 "	/90	599
PLANK FLOOR	3300 S.F.	/09	297
DOORS & WINDOWS	2399 "	/25	599
PARTITIONS	551 "	/09	49
(SEE NOTE) WOODEN STEPS	126 "		21
TIE-BEAM, RAFTER, PURLIN ETC	605 C.F.	/90	544
ATTAP ROOFING	5524 S.F.	/05	276
THREE WAY STRAP 1¾"x⅜"	44	/60	26
STIRRUP STRAP 1¾"x⅜"	22	/50	11
STRAP 1¾"x⅜"	44	/50	22
			2778

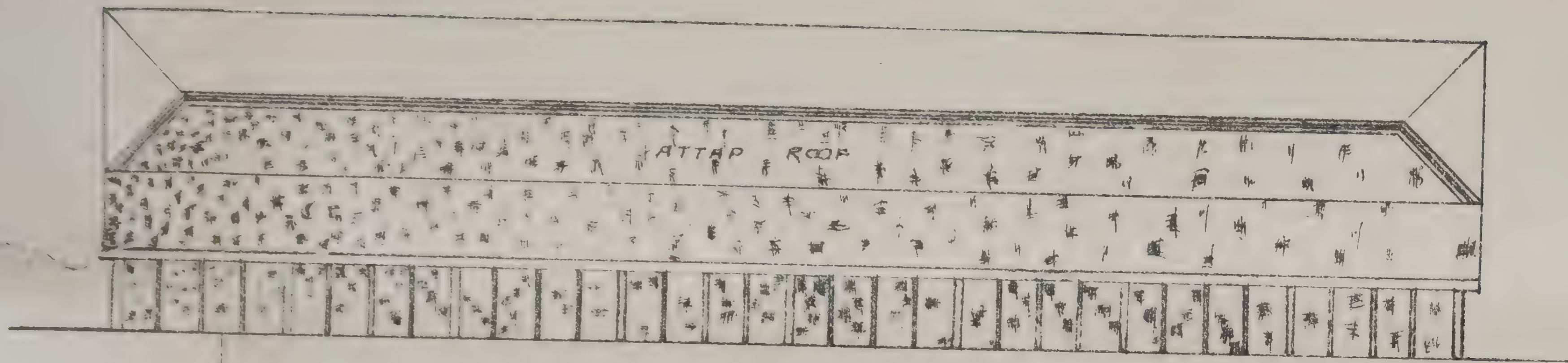
NOTE:
4 FEET WIDE STEPS $6.00
5 " " " 9.00

DISPENSARY AND HOSPITAL WARD
SCALE 1/8 TO ONE FOOT

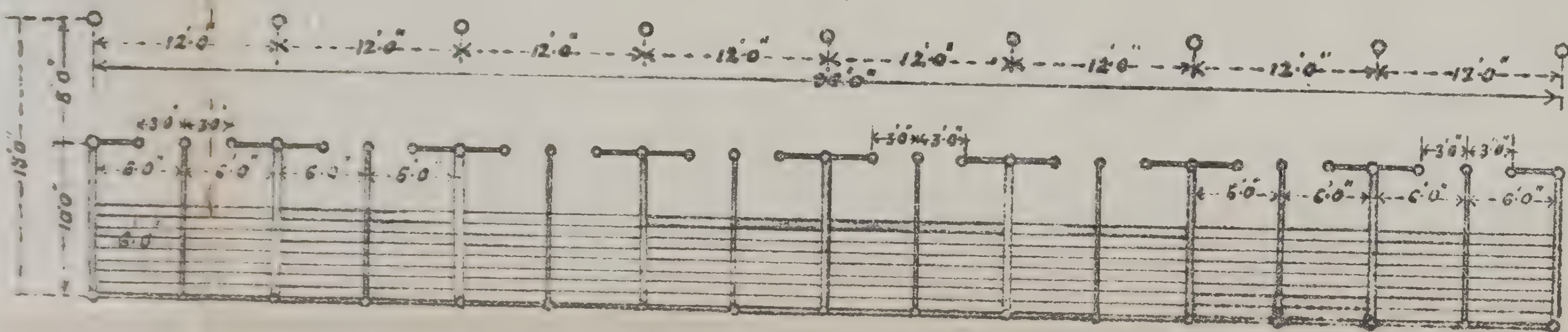


Lithographed at the Surveyor General's Office Singapore November

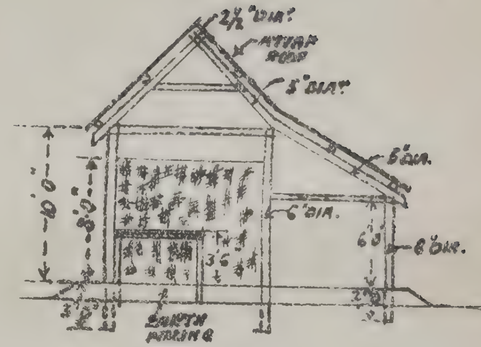
SCALE 1/16 INCH TO ONE FOOT



BACK ELEVATION



PLAN



SECTION

PARTICULARS	CONTENTS	RATE	$	CTS
EXCAVATION	6½ C.Y.	-/20	1	30
EARTH FLOOR	90⅔ "	-/25	22	66
POST 6" DIA.	310 L.F.	-/06	18	60
POST 4" "	152 "	-/03	4	56
" 3" "	440 "	-/02½	11	00
ATTAP WALLS	2512 S.Y.	-/05	125	60
WALL PLATES 6" DIA.	324 L.F.	-/04½	14	58
BED BOARD 1" THICK	5765 Sq.F.	-/10	57	60
RAFTER 5" DIA.	644 L.F.	-/05	32	20
COLAR 4" DIA.	152 "	-/03	4	56
PURLIN 3" DIA.	654 "	-/02½	16	35
ATTAP ROOFING	2873 Sq.F.	-/05	143	65
ATTAP DOORS	384 "	-/06	23	04
			475	70

Lithographed at the Surveyor General's Office Singapore November 08

AGRICULTURAL BULLETIN

OF THE

STRAITS

AND

FEDERATED MALAY STATES.

No. 4.] APRIL, 1907. [Vol. VI.

Annual Report of the Botanic Gardens, Singapore and Penang, for the Year 1906.

Staff.

1.—There was no change in the Staff during the year, except that an apprentice Sub-Overseer, by name of SILVESTER PAUL, was taken on in May. The Superintendent of Penang went on sick leave for a year, in March, and it was suggested that the Assistant Superintendent of the Singapore Gardens should take his place during his absence as has had to be the system previously, but, in view of the Agricultural Exhibition in August, and the heavy increase of work of the department due to the rapid development of the agriculture of the Peninsula of late years, it was found impracticable to reduce the staff to the Director only, so that Mr. PEEL (Ag. Collector of Land Revenue) superintended the work of the Penang Gardens. The Clerk of the Department, Mr. J. S. ISAAC, and the Artist, Mr. C. DE ALWIS, were on leave for three months each during the year. The coolies were as poor a lot as ever, the demand for labour on estates at higher wages than is allowed for the Botanic Gardens made it impossible to secure men other than sickly and worn-out labourers rejected by planters.

Visitors.

2.—A very large number of visitors, sometimes as many as six in a morning, came during the year to consult the Director, chiefly on the subject of rubber planting. The opening up of the Federated Malay States, due to the immense development of rubber cultivation, has immensely increased the number of visitors

to the Garden in search of information, and has equally increased the correspondence of the department, and the prospective opening up of the territory of Johore which will follow on the completion of the railway will, without doubt, largely increase the work in the near future.

Among the more important scientists, agriculturists and others who visited the Gardens and spent some time there were P. Olson-Seffer (Mexico), Dr. Schlechter, Dr. Deisler, Mr. Unger (Yokohama), Professor Campbell (Stanford University, U.S.A.), Mr. Shaw-Hellier (Jamaica), Mr. A. W. Prautch (Manila), Mr. Ryan (Ceylon), Mr. Taupin (Madagascar), Dr. A. H. Suggett (Mexico), Mr. H. Price (Boston, U.S.A.), Mr. Bienenfels (San Francisco), M. Vernet, Dr. Wegener (Berlin), H. H. Prince Yugala (Siam).

Thefts.

3.—The most important theft during the year was of five hundred rubber seedlings by natives at night from the Economic Gardens. Very extensive thefts had occurred of this nature all over the Peninsula, and seedlings were being shipped in vast quantities to Dutch Borneo. A Malay was arrested with a large number of the source of which he could give no credible account, but the case against him was not considered sufficiently clear so that it was dismissed. A Chinaman was caught in the evening collecting Wormia leaves, and fined five dollars, and there were a few thefts of flowers, fruit, etc., of the usual style.

The regulations as to dogs admitted to the Gardens when led by a string only having been allowed to be relaxed somewhat, as has previously happened, certain visitors brought dogs under no control which did damage in the Gardens, and the rule had to be strictly enforced again, and some little trouble was caused by thoughtless riders galloping their horses on the turf and spoiling it.

Roads and Drives.

4.—The exceptional humidity of the year caused much damage to the Garden drives, and the following urgently needed repairs were executed and paid for out of the Gardens Vote.

The drive from the top of the plant house to the cross ways below the band-stand was remetalled with three inches of laterite, gravelled and rolled, being of length of 200 yards and width of 11 feet.

The drive from the terrace steps to the cross ways by the end of the red-stemmed palm avenue was remetalled with three inches of laterite, gravelled and rolled for a length of 80 yards by 18 feet width.

The road from the godown to the plant house was remetalled with three inches of laterite, gravelled and consolidated for 95 yards and 11 feet width.

The four-foot way from the main entrance to the drive near the old aviary was regravelled for 135 yards.

The road from Garden Road to the officers' quarters was remetalled with three inches of laterite, gravelled and consolidated for 200 yards and 15 feet in width, and regravelled for 97 yards.

The main drive from the office to the band-stand, which is steep and had scoured, was patched to a considerable extent.

The Garden road of a length of nearly five hundred yards, running from Tyersall Road to Dalvey Road, was remetalled by the Public Works Department.

Drains and Culverts.

5.—A mason and coolie were employed nearly the whole year in patching and renewing urgently needed work. Two small drains with cemented catchpits were made across the road between the plant houses and godown. The side drains from terrace steps towards the old aviary for 75 yards length and 6–7 inches wide were renewed.

The side drains along the four-foot path from the main entrance to the old aviary were patched and repaired. The side drain from the main entrance along the drive for 295 yards was renewed. The large culvert near the officers' quarters was lengthened and a new catchpit made. The cement paths in the plant-house and sheds were repaired and as much of the old aviary demolished as time allowed, the bricks being used for repairs. The unsightly culverts on the band-stand paths have been renewed and lowered so as to admit of a regular even path, and at the same time the side drains on both sides of the path for 40 yards on each side were renewed. The drain on one side of the main drive from the plant-house steps to the band-stand has been deepened and renewed for a distance of 90 yards.

New or Noteworthy Plants.

6.—Among the more interesting novelties which flowered during the year were:—

Malayan:—*Didymocarpus perdita.*—(Pulau Battam).
Vanda hastifera.—(Borneo).
Aeschynanthus tricolor.—(Borneo).
Aeschynanthus Lobbiana var?—(Borneo).
Habenaria xanthocheila.—(Penang).
Gastrochilus pulchellus n. sp.—(Borneo).
Globba brachyanthera.—(Borneo).
Clerodendron n. sp.—(Borneo).
Begonia oblongifolia.—(Borneo).
Begonia promethea.—(Borneo).
Peperomia n. sp.—(Borneo).
Hapaline appendiculata n. sp.—(Borneo).
Schismatoglottis brevipes.—(Perak).

Medinilla speciosa.—(Selangor).
Tacca vespertilio n. sp.—(Perak).
Tacca minor.—(Kelantan).
Strophanthus Jackianus.—(Sumatra).
Ceratolobus lævigatus.—(Perak).
Cypripedium glaucophyllum.—(Java).
Saccolabium sp. new.—(Perak).

Siam:—*Aneilema sinicum.*
Habenaria geniculata.—(Shan States).
Ruellia sp.

China:—*Lycoris radiata.*
Licuala peltata.

Christmas Island:—*Abutilon Listeri.*
A. auritum.

Africa:—*Tinnæa aethiopica.*
Crinum sp. Accra.
Culcasia Manii.—(Flowers and fruits).
Amaryllis Bellandonna.
Sanseviera grandicuspis.

Madagascar:—*Brexia madagascariensis.*

South America:—*Pitcairnea andræana.*
Solanum rubrum.
Solanum Lobelii.
Solanum texanum var tricolor.
Salvia hispanica.—(Cuba).
Sagittaria natans.
Utricularia sp.
Dracontium polyphyllum.

Garden origin:—*Crinum hybrid.*—(Todaro).
Crinum Northianum—fruited for the first time, the fruit being hitherto unknown.

The water lilies in the lake were propagated and made a fine show throughout the year, and a number of new kinds were introduced. There was a good exhibition of Gloxinias for most of the year, some very fine strains having been obtained. The Gramatophyllums in the Gardens did not flower at their usual time in August and September, but commenced flowering in December.

New Plants Introduced.

7.—Among the new plants of interest introduced were Palms, *Cocos datil*, *Yatay*, *Calamus paspalanthus*, *Dæmonorops propinqua*, *Gaussia princeps*, *Copernicia* 3 species, *Areca flammula*, *Roscheria melano, Choetes*. Among Ferns, *Aspidium erythrosorum*, *A. descursivopinnatum* and *viridescens*, *Sophoroids*, *Gymnogramme lotta*, and *Lygodium japonica* from Japan. A collection of succulents from Hamburg, and additional set of *Nympheas* and *Cyperus papyrus* from Dreer of Philadelphia, and a collection of the *Yautias* (Keladi) of Cuba.

Plants Received.

8.—During the year 6,371 plants and 438 packets of seeds were received, beside the usual stock of flower seeds purchased. The donors were:—

Messrs. Gibbs, Stephens, St. V. B. Down, Choa Kim Keat, Micholitz, Hoe Eng Watt, Von Uslar, Loher, P. S. Falshaw, M. Laurent, Snow, Beauclerk, Col. Power, R. Little, Dr. Gimlette, Bidwill, J. C. Harvey, E. M. Holmes, Professor Sargent, Dr. Schlechter, Boehmer & Co., Sanders & Co., Herb & Co., Danman & Co., Dreer & Co., and the Botanic Gardens of Saigon, British Guiana, Baroda, Cuba, Rangoon, Berlin, Trinidad, Guiana, Madras, Washington, Sydney, Annam, Hamburg, Arnold Arboretum, Nogent sur Maine, Hanoi, and Philadelphia.

Export.

9.—There were, excluding Para Rubber plants and seeds, 1,964 plants and 314 lots of seeds exported. The recipients were Dr. Preuss, Chief Surgeon, Luang, Prabang, Mr. J. Harvey, Mr. A. D. Machado, Mr. Woodford (Solomon Islands), Mr. Dreer, Mr. Choa Kim Keat, Mr. Chatterjee, Messrs. Sanders & Co., Mr. Hoe Eng Watt, Col. Power, Mr. Beauclerk, Mr. Hewitt, Mr. Taupin, Mr. Abrahams, Mr. Williams, Mr. Down, Mr. Bird, Messrs. Danman & Co., Mr. J. D. Pereira, Mr. Rankin, Mr. Goodfellow, the Botanic establishments of Sydney, Jamaica, New Guinea, Penang, Teynampett, Christmas Island, Hamburg, Washington, Trinidad, Melbourne, British Guiana, Port Darwin, Fiji, Kew, Cuba, Thaiping, Berlin, Hanoi, S. Nigeria, as well as the Royal Engineers Hospital, Blakan Mati, Pulau Pisang and Raffles Lighthouses, General Hospital, Government House, P.W.D. Grounds, Forest Department, F.M.S., Residency Malacca, Ordinance Office Pulau Brani, Kandang Kerbau Hospital, Colonial Secretary's Bungalow, etc.

Herbarium.

10.—As it was impossible for the Director to make any expeditions this year, except one to Malacca and Province Wellesley, no great amount of collecting could be done. A large collection of herbarium was received from the Manila Botanic Gardens, and a large number from the Buitenzorg Gardens. Indian

and Philippine plants were received from the British Museum, and specimens were received from Kelantan from Dr. GIMLETTE, and from Selangor by Mr. A. M. BURN-MURDOCK, who also sent some wood specimens and two cases of plants collected by Mr. FOX and the Forest Officers in Lankawi and Penang. Specimens from Southern Siam were received from Mr. DOWN, and a number of interesting plants from Sarawak collected by Mr. HEWITT.

Five hundred and eighty-three specimens were sent to Kew, and a case containing a five-stemmed Betel-Nut Palm and other specimens of climbers, etc., 472 specimens to Mr. YUSUN KUDO of Japan in exchange for plants previously received, 153 to the British Museum, 386 to Manila, 156 to Dr. TRELEASE of Missouri, 24 specimens of Palms to Dr. BECCARI, 238 specimens to Professor SARGENT, Arnold Arboretum, 238 to the Botanic Gardens, Calcutta, 164 to Sydney, and 90 to West Australia.

Additional glass cases were obtained and a series of Dammars, Rubbers and Gutta Perchas arranged and labelled. A fine collection of Dammars from the Moluccas, named and priced, was presented by Mr. W. D. DIEPENHEIM, who also presented a collection of Oils, Tea, Spices, Sugars and other Economic produce from the Eastern Islands.

Library.

11.—The following books and pamphlets were received during the year:—

BURKILL, T. H.—Gentianarum species Asiaticæ.
,, Swertia angustifolia.
,, Parasite upon a Parasite.
MAIDEN, J. H.—Useful Australian Plants.
,, Weeds of New South Wales.
,, Allium fragrans.
SARGENT & PECK—Cratægus species, of Albany.
ALBERT, F.—El Cultivo del Olivo.
,, El Karri e Eucalyptus diversicolor.
,, Los Servicios de Aquas e Bosques.
CLARKE, C. B.—New Philippine Acantheaceæ.
ELMER, A. D. E.—Leaflets on Philippine Botany "Rubiacæ."
,, A Fascicle of Benguet figs.
,, Additional New Species of Rubiaceæ.
,, Pandanus of East Leyte.
AHERN, Capt. G. P.—Notes on India Rubber and Gutta Percha.
,, Charcoal Industry in the Philippines.
,, Annual Report on the Philippine Forests.
CASTILLO, LIUS.—La Caza de la Ballena.

MERRITT, M. L. & WHITFORD—A Preliminary Working Plan for the Forests of the Philippines.

GARDNER, R.—Mechanical Tests of Thirty Philippine Woods.

FAIRCHILD, D.—Our Plant Immigrants.

LIPPINCOTT, J. B.—The Yuma Reclamation.

HENRICKSEN, H. C.—Vegetable Growing in Porto Rico.

PIPER, C.—Contribution X from the National Herbarium.

KRAMER, H.—Origin and Nature of Color in Plants.

BREDA, DE HAAN.—Report on Arachis hypogæa.

CRAMER, P.—Report on Cassava.

CHRIST, H.—Filices Insularum Philippinarum.

" Filices Cavalerianæ.

LENDENFELDT—Relation of Wing Surface to Weight.

NEWELL, T. H.—The Work of the Reclamation Service.

MACGREGOR, K., & WORCESTER, D. C.—List of the Birds of the Philippine Islands.

HULLETT, R. W.—Presented 5 Volumes of the Transactions of the Linnean Society.

WRIGHT, H.—Hevea Braziliensis, Editions 1 & 2.

WILLIS, J. C.—Rubber in the East.

Also the usual series of Journals, Reports and other publications of the various Botanic and other Establishments of the World.

Purchased :—Le Caoutchouc en Indo-Chine by C. & A. SPIRE.

The Gardeners' Chronicle, Botanical Magazine, Journal of Linnean Society, Indian Planting and Gardening, India Rubber and Gutta Percha Trades Journal, and Pflanzenreich.

Publications.

12.—The printing of the Volumes on Monocotyledons for the Materials for "A Flora of the Malay Peninsula" was commenced, and is expected to appear in a month or two. They are divided into two volumes, which are being printed simultaneously. The first volume contains the Hydrocharideæ and Orchideæ, the second the rest of the orders. Papers on the Begonias and on the Scitamineæ and the Grasses and Sedges of Borneo and a complete account of the expedition to Christmas Islands and the Flora thereof were published in the "Journal of the Straits Branch of The Royal Asiatic Society" by the Director, and also an article on the Scitamineæ of the Philippines, published in a Manila Journal. All the types of the species described are conserved in the Botanic Gardens, Herbarium.

The "Agricultural Bulletin" was published as regularly as could be done by the printers, and there was no falling off in the demand for it. Mr. J. B. CARRUTHERS became assistant Editor in the beginning of the year. Most of the articles dealt with Rubber cultivation and manufacture, but fibres, oil-grasses and other

subjects were treated of. The article on Malayan drugs, printed many years ago in the "Straits Medical Journal" by the Director, and long unprocurable, was reprinted and very much augmented. Investigations were also made into the action of copper sulphate on water weeds, and especially on the laterite-forming Bacterium Crenothrix, and an account published in the Bulletin.

The Artist continued making drawings of important plants, and towards the end of the year, in the rainy season, made a large series of drawing of the soft Fungi, of which little or nothing is at present known, and which are almost impossible to preserve even in alcohol in this country, so that coloured drawings are the only way of recording and identifying them satisfactorily. Of a few drawings sent previously to Kew of these plants all proved to be unknown previously to science. A few more supplementary lecture diagrams were also made by the Artist. The lectures to the Medical Students were delivered by the Director from September to December twice a week, as on the previous occasion.

Agri-Horticultural Show.

13.—The Annual Exhibition was held this year at Singapore, and was probably the largest Exhibition of the kind ever held in the East. The exhibits from all parts of the Peninsula were remarkably good on the whole, and the Exhibition was attended by very large crowds of visitors and some delegates from Java, India, Ceylon, Burmah and other places. The secretarial work of the Exhibition, which was very heavy, was effected by the Director and Mr. J. S. Isaac, Clerk of the Botanic Gardens Department.

Economic Garden.

14.—This part of the Gardens has steadily increased in usefulness and importance, not only to the local community, but to all the tropical parts of the Empire, and indeed it would be difficult to over-estimate its utility. All tropical plants are experimented with and stocks of all for which there is or is likely to be an exceptional demand are maintained in considerable quantities. It may give some idea of the work carried out if it is mentioned that during the year plants or seeds have been despatched on sale to countries as remote as the West Indies, including Cuba, Samoa, Honolulu, Queensland, New South Wales, West Australia, Fiji Islands, Philippines, New Guinea, China, Hongkong, Borneo, Sumatra, Java, India, Ceylon, Egypt, Lagos, Nigeria, and Madeira, while the local demand from the Colony and Federated Malay States has increased enormously.

Apart from the ordinary interchange between gardens, so greatly has the work increased that the addition of five men has been sanctioned for the new year. At the present time the labour employed is quite inadequate for the due maintenance of the garden, nor is it possible, even at a time when agriculture is developing in the Peninsula at such a rate, to carry out experiments which are urgently required. A request for an additional assistant

so as to put the Gardens of the Straits Settlements on the level in staff of some, at least, of the smaller Gardens of the other Colonies was inserted in the Estimates for the next year, but circumstances prevented this addition to the staff being made.

The keen demand for Para rubber seed from the Garden trees necessitated the frequent mowing and cleaning of the ground and drains so as to procure every possible seed, and as this part of the Garden is hardly above sea-level and the ground frequently flooded the growth of the weeds is very rapid. Watchmen have had to be employed too to prevent the seeds and plants in the nurseries from raiders. The largest undertaking in this Garden, apart from the routine and urgent work, during the year consisted in digging the young Rubber ground, formerly under grass, three times over so as to thoroughly eradicate the grass and weeds. The plot is 300 yards long and 120 yards wide, and when it had been thoroughly cleaned and was sufficiently dry it was planted up in blocks with Tapioca, Ground-nuts, Ramie, Lemon Grass, Citronella and Cus-Cus. Hitherto it had been impossible to grow the rubber trees here on account of a plague of brown slugs which, concealed by day in the grass weeds, attacked the buds of the rubber by night preventing its growth. The result of this cultivation of catch-crops between the young rubber has been the extermination of this pest, and the growth of the young plants very satisfactory.

The question of catch-crops for rubber has been one of the most important ones of the year, and is the subject of a large quantity of the garden correspondence. It is regrettable that the paucity of the staff prevents time being given to experiments on this subject carried out as they should be.

A good deal of Colonial interest during the past two years has been taken in fibres of all sorts, and the plot of land opened last year has been maintained and large stocks of the most likely fibres for cultivation here have been raised.

Among the most free-growing fibres as judged by its strong development of leaves is Sanseviera guineensis. S. zeylanica has grown well also, but is not quite so quick in supplying a good stock of leaves. S. sulcata and S. cylindrica have proved healthy, but, though furnishing the largest supply of fibre for the leaf and being the easiest to handle for machine work, are unfortunately too slow as a catch-crop in this country.

Mauritius hemp grows well in ordinary soils. Sisal hemp has been kept under observation, but does not seem to do well; it is essentially a plant for dry sandy loose soil.

The Coffee and Rambong ground has been well maintained. No part of the Gardens is well suited to these plants, but for the purpose of meeting the demand for Rambong (Ficus elastica) cuttings it has been possible to produce 150 rooted cuttings by marcotting, and though the parents may never develope into robust plants they will serve as stock plants. The demand is chiefly, however, for seed and seedlings, and a strong batch of seedlings raised here were disposed of through the year.

Export of Para Rubber Seed.

15.—During the year a very large number of Para Rubber seeds and plants were sent out to all parts of the world, of these a large number were supplied from the Botanic Garden trees, others were obtained outside from various plantations and packed and shipped. The packing of these seeds for long distances entailed a great amount of work, as they had to be packed in tin boxes, 150 seeds in a tin with burnt rice dust. Two tins were then enclosed in a canvas covering, addressed, and then sent by post, so as to avoid the seeds being heated in the hold. This plan has been proved eminently successful, and the percentage of seed that arrived safely at long distances such as Jamaica, Solomon Islands, West Africa, etc., has been very high.

The following were the localities to which the seeds were sent :—

Seeds from the Economic Garden Trees.

Singapore	15,510
Province Wellesley and Perak ...	48,950
Selangor	80,795
Christmas Island	2,400
Borneo	100
British Solomon Islands	600
British Guiana	2,100
Queensland	150
Philippine Islands	500
Honolulu	800
Mexico	900
Sumatra	2,000
Uncertain destination	2,800
Total ...	157,605

Seeds Purchased elsewhere, Packed and Shipped at the Botanic Gardens.

Jamaica	200,000
Lagos and Nigeria	80,000
Pahang	43,000
Sumatra	10,000
Kelantan	7,000
Borneo	300
	345,300

Total number of seeds exported 502,905.

A larger number of seedlings also were exported, viz:—

Singapore	3,200
Borneo	8,050
Sumatra	3,200
Uncertain destination	100
	14,350

It is gratifying to note that far the larger portion of these seeds have gone to various parts of the British Empire, and only comparatively few to other countries.

Other Plants Exported.

Ficus elastica is less in demand, and only 510 plants were exported this year to Sydney. A large number of seeds were exported to Southern Nigeria, 1,000 Coconuts were purchased and packed and transmitted there, and several bags of Nipa seeds and of Sago seed. These are reported to have arrived in good condition. Mangosteen and Durian seed were also sent. The latter is especially a bad traveller, as the seed is very fleshy and soon spoils.

Experiments on Rubber Tapping.

16.—A series of experiments were carried out through the year to test the effect of tapping at all seasons of the year, and a special and full report was sent to the Government on the result. There was a vote of $1,200 allowed for these experiments, which actually cost $1,178.50. This vote was refunded to the Government from the money received by the sale of the rubber made during the experiments, which amounted to $2,600.41, so that the experiments cost the Colony nothing at all. A quantity of Latex was supplied to the Agricultural Exhibition to make into Crepe with a Crepe Machine, and a quantity of rubber in different forms sent to the Exhibition in Ceylon.

Inspection of Coconut Trees.

17.—Notices were served on 192 persons during the year, and 720 dead trees, 294 stumps, and 60 piles of rubbish likely to harbour beetles or already containing them were destroyed. There were no prosecutions.

	$	c.
Vote for the year	210	00
Expenditure	193	64
Balance	16	36

HENRY N. RIDLEY,

Director of Gardens, S. S.

Botanic Gardens,

Singapore, *February* 23, 1907.

The following details of Revenue and Expenditure are appended. It is noticeable that there is a balance of $1,875.74 at the end of the year, which requires explanation. The annual vote supplied by the Government is not adequate for the expenses of the Gardens, and one-third of the cost is made on sales, and, as the money for the sales does not come in till late in the year, it is essential to keep a strong balance for the early part of the following year.

Receipts and Expenditure of the Botanic Gardens for 1906.

Receipts.

	$	cts.
By Balance in Bank on 1st January 1907	1,261	03
Government Grant for the year 1906	8,000	00
By Sale of Economic Plants and Seeds and Revenue Recovered	8,037	71
By Sale of Ornamental Plants and Seeds	1,270	52
Interest on the above	30	28
Total	$18,599	54

Expenditure.

	$	cts.
Wages of Coolies	5,939	09
Petty Expenses and Assistant Superintendent's Transport ...	910	26
Cartage	1,022	65
Laterite (181 cubic yards) ...	398	20
Gravel (129 cubic yards) ...	219	30
Manure (61 cubic yards) ...	76	25
Sand (46 cubic yards) ...	73	60
Purchase of Plants and Seeds ...	1,803	37
Telephone	90	00
Methylated Spirit, Jeye's, etc. ...	44	55
Timber and Planks	528	02
Pots and Tubs	517	79
Cloth for Packing Parcels ...	127	25
Tools and Stores	958	05
New Wardian Cases	194	00
Books and Papers	292	09
Freight and Postage on Plants and Seeds sent out	2,979	32
Uniforms	47	25
Packing Tins	161	00
Lime and Bricks	164	19
Purchase of New Safe	179	40
Miscellaneous	60	65
Balance in Bank on 31st December 1906	1,875	74
Total		

Receipts and Expenditure of the Botanic Gardens Department, Singapore, during the Year 1906.

Items of Estimates.	Govt. Grant. $	c.	Expenditure. $	c.	Balance. $	c.
1.—Personal Emoluments	12,864	00	11,906	07	975	93
Other Charges.						
2.—Expenses of carrying out the Provisions of the Coconut Trees Preservation Ordinance	210	00	206	70	3	30
3.—Expenses in Connection with the Publication of the "Agricultural Bulletin" ...	300	00	300	00	—	
4.—Expenses of Carrying out Experimental Rubber Tapping	1,200	00	1,191	50	8	50
5.—Grant to Botanic Gardens	18,599	54	16,723	80	1,875	74
6.—Travelling and Personal allowance ...	500	00	384	65	115	33
Special Expenditure.						
7.—Furniture for Herbarium	1,000	00	1,000	00	...	...

Botanic Gardens, Penang.

Staff.

1.—Mr. Fox went on leave on March 23rd, and there being no Officer of the Department available to take his place, I was placed in temporary charge in addition to my other duties.

This arrangement continued during the remainder of the year, but it could hardly be considered satisfactory.

The Overseer, Mahomed Haniff, looked after the technical work and did it extremely well; the Gardens were kept by him in excellent order, but in the absence of a properly qualified European, scientific research made little or no progress.

In addition to this the Clerk was transferred and a new man with no experience of the work took his place.

The Inspector under the Coconut Trees Preservation Ordinance and the Mandor on the Hill died during the year.

Buildings and Upkeep.

2.—The office ceiling partially collapsed and it was found necessary to make immediate repairs. So much damage had been done in the past to the wood flooring by white ants that it was decided to put in a cement flooring. A special vote of $1,500 was granted by Government and this work was carried out. The roof of the building was raised and the whole structure generally improved.

In the plant houses the atap roofing was replaced by ruberoid, which has proved quite satisfactory and is more lasting.

In several of the houses the tables were cemented as a means of keeping away the white ants.

The roads were kept in good repair and the general condition of the grounds and buildings reflects great credit on the Overseer in charge.

The new rockery near the stream below the wooden rustic bridge was practically completed. A large number of ferns have been placed there, and a large specimen of the Impatiens Mirabilis or Gouty Balsam obtained from the Langkawi Islands added.

This rockery forms a very pleasant addition to the Gardens.

Plants.

3.—No new variety of plant was added to the Gardens during the year. The Overseer, however, performed several grafting experiments.

The grafting of the well known "La France" rose on the common local variety proved a success, a fine rose with a most delicate odour being obtained. Some interesting results were also obtained by grafting the violet Allamanda on the yellow variety.

A visit was paid to the Langkawi Islands in August, when a number of orchids and another specimen of the Impatiens Mirabilis were obtained.

A number of plants were supplied to the Government Plantations, Perak, and some promised in return from the Taiping Hills.

Plant sales, exclusive of $74.25 received for rubber seeds, realised $319.25 as against $566.80 in 1905. This falling off was mainly due to the fact that certain restrictions were placed on the sales owing to there being no European in regular attendance at the Gardens.

Publications.

4.—The usual periodicals were received during the year, and an interesting work presented by Messrs. VEITCH & SONS containing a good deal of useful information especially with regard to varieties of Orchids.

Para Rubber.

5.—The old Para Rubber tree at the Gardens was tapped in November and December and 4 lb. 4½ oz. of dry rubber obtained; this makes a total of 35 lb. 13½ oz. from the tree since it was first tapped. The tree reached the height of its production in 1905 when 4 lb. 12½ oz. of rubber were obtained. The upper branches are beginning to wither and there is little doubt that it will now deteriorate. Although the Experimental Garden on Penang Hill has been abandoned and is now partially covered with secondary growth, experiments were made on four of the Para Rubber trees standing there. As the altitude is about 2,000 feet the results were interesting. The age of the trees was about 12 years and the total dried rubber obtained 6 lb. 6 oz. Appendix A. gives the results of the various tappings.

If proper implements for tapping the trees and drying the rubber were obtained, it might be of advantage to systematically tap all these trees as well as those in the Botanic Gardens themselves, where 21 trees exist ready for tapping. 3,600 rubber seeds were sold from the Gardens during the year for $74.25, the price ranging from $20 to $7.50 per thousand.

Penang Hill.

6.—The coolies employed in the compound of the Governor's Hill Bungalow and the vegetable gardens were placed under the charge of Mr. FERNANDO, the Public Works Overseer on the Hill. The supervision was infinitely better than it had been for the previous two or three years, and the gardens gave evidence of increased industry on the part of the coolies. That this increased industry was not spontaneous was evident from the fact that several complaints were received from the coolies regarding the increased severity of the tasks they were called on to perform.

A new additional vegetable garden was started just below Belle Vue Bungalow and has proved a success.

Preservation of Coconut Trees.

7.—Owing to the death of Mr. BALHATCHET the returns for the first four months of the year could not be found.

The number of notices issued during the last eight months of the year in Penang and Province Wellesley was 450.

There were 13 prosecutions in Penang, 12 convictions being obtained; the fines realised amounted to $40.

Appendix B. summarises the work done under this head. The fines inflicted by the Magistrates for breaches of this Ordinance are so small that they do not act as a sufficient deterrent.

General.

8.—As Honorary Secretary for Penang, I attended the Agri-Horticultural Show at Singapore in August. A fair number of exhibits were taken from Penang and a large proportion of prizes obtained, including the cup for the best collection of fruits and the first prize for the best Palm.

9.—The weather during the year was more irregular than usual; rain fell incessantly during the first eight days of November, while the fall in December was unusually high.

The total rainfall on the Hill was 123·79 inches, and at the Gaol 112 inches, as against 100·9 inches and 78·31 inches respectively in 1905. The latter year was, however, an exceptionally dry one.

10.—Nothing further was said regarding the proposal to make a large impounding reservoir on the site of the Gardens, and it is hoped that the necessity for it may not arise.

The Municipal Commissioners acquired a large tract of land above the waterfall for the purpose of improving the present Catchment Area.

Expenditure.

11.—The usual statement of expenditure is to be found in Appendix C.

W. PEEL,
Acting Superintendent of Gardens.

APPENDIX A.

Date of Tapping, 1906.		Weight of dry Rubber obtained at each operation in ounces.														Total weight of dry Rubber		Remarks.
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	lb.	oz.	
I.—*Old Tree in Botanic Gardens*:—																		
From 19th November to 15th December		$\frac{3}{4}$	4	$6\frac{1}{4}$	$4\frac{3}{4}$	$5\frac{1}{2}$	$6\frac{1}{2}$	6	$7\frac{1}{2}$	$6\frac{1}{2}$	$5\frac{1}{4}$	4	4	4	$3\frac{1}{2}$	4	$4\frac{1}{2}$	
II.—*Trees on Penang Hill*:—																		
From 11th July to 6th August ...	*a*	$\frac{3}{4}$	$1\frac{1}{4}$	2	$1\frac{1}{4}$	$2\frac{1}{2}$	1	1	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{4}$	$2\frac{1}{2}$	$1\frac{1}{2}$	1	$4\frac{1}{4}$	
	b	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	1	$1\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	1	1	1	$1\frac{1}{4}$	$1\frac{1}{4}$	...	$11\frac{1}{2}$	
	c	$\frac{3}{4}$	1	$1\frac{1}{2}$	$1\frac{1}{2}$	2	$1\frac{3}{4}$	$1\frac{1}{2}$	$1\frac{1}{2}$	2	2	$2\frac{1}{2}$	2	$1\frac{1}{2}$	$2\frac{3}{4}$	1	$8\frac{1}{4}$	
	d	$1\frac{1}{4}$	$1\frac{1}{4}$	2	$3\frac{1}{4}$	$3\frac{1}{2}$	$3\frac{1}{4}$	$3\frac{1}{4}$	4	4	$3\frac{3}{4}$	$3\frac{1}{2}$	$3\frac{1}{2}$	6	$3\frac{1}{2}$	2	14	

NOTE:—Two and a half ounces of scrap were collected from the tree in the Gardens, and five and a half ounces from the trees on the Hill.

W. PEEL,

Ag. Superintendent of Gardens.

APPENDIX B.

Return of the Inspector of Coconut Trees for the last 8 Months of the Year 1906.

No. of Notices issued during the year from 1st May to 31 December.	No. of dead Coconut Trees destroyed.	No. of dead Coconut Trunks destroyed.	No. of heaps of Cattle dung destroyed.	No. of heaps of Paddy-husk destroyed.	Amount of Fines received. $	Amount of Fines received. c.	Remarks.
Penang District :							
250	166	816	179	2	40	00	13 Prosecutions. 12 Convicted. 1 Withdrawn.
Northern District :							
87	109	133	40	...	...	...	
Central District :							
68	74	202	33	...	...	...	
Southern District :							
45	52	116	43	...	...	...	
450	401	1,267	295	2	40	00	

APPENDIX C.

Expenditure of the Botanic Gardens, Penang.

Government Grant.	Estimated 1906. $	c.	Expenditure.	$	c.
Maintenance of Waterfall Gardens	4 960	00	Wages	3,752	04
			Tools and Materials	111	31
			Manure	188	00
			Freight	9	00
			Ruberoid Meranti Laths and Attaps for Plant Sheds	552	02
			Flower Pots	88	54
			Metal for Road	93	75
			Miscellaneous and Petty Expenses ..	156	04
				4,950	70
			Balance	9	30
			Total	4,960	00
Upkeep of Grounds of Governor's Hill Bungalow.	1,620	00	Wages	1,245	53
			Tools and Materials	59	24
			Vegetable Seeds	59	19
			Manure	107	00
			Flower Pots	37	50
			For carrying Manure and Flower Pots to Hill Gardens ...	71	22
			Miscellaneous and Petty Expenses ..	5	99
				1,585	67
			Balance	34	33
			Total	1,620	00
Travelling and Personal Allowance	440	00	Pony Allowance	240	00
			Sea and Field Allowance	140	70
				380	70
			Balance	59	30
			Total	440	00
Expenses of carrying out the Coconut Trees Preservation Ordinance ...	300	00	Allowance to Inspector of Coconut trees	234	84
			Destruction of dead Coconut trees ..	63	72
				298	56
			Balance	1	44
			Total	300	
Purchase of Books and Periodicals	100	00	Books and Periodicals	38	86
			Balance	61	14
			Total	100	00

W. PEEL,

Ag. Superintendent of Gardens.

CEYLON, STRAITS, & MALAY STATES PLANTATION RUBBER REPORT.

15th February 1907.

The following lots comprising about 3½ Tons Ceylon and about 20 Tons Straits and Malay States were offered at auctions to-day and sold as follows :—

Ceylon.

MARK.	QUANTITY, DESCRIPTION AND PRICE PER LB.
K M	1 case sheets biscuits and very mixed 5/7.
Ambatenne	2 cases palish and darkish amber biscuits, 5/8, 5/8¼. 1 case good clean pale scrap, 4/6½. 1 case darkish scrap part dirty, 4/5¾. 1 case dirty scrap bought in.
Good view	1 case biscuits, dark thin, 5/8.
Waharaka	3 cases scrap, common, 4/4. 1 case biscuits, very dark, 5/8.
Ballacadua	2 cases block chip crêpe, 5/2. 2 cases pale biscuits, 5/8½.
Udapolla	4 cases rough biscuits, 5/8. 1 case good pale scrap, 4/6¾,
We'oya	2 cases mixed biscuits, 5/8¼.
Culloden	5 cases fine amber biscuits, 5/8½. 9 cases fine pale crêpe, 5/9¼. 6 cases brown crêpe, 5/4¼. 2 cases black chip crêpe, 5/2¾.
Ellakande	3 cases fine pale blscuits, 5/8½.
Nekakotua	3 cases small rough sheets, 5/8½,
J J V & Co.	6 cases brown scrap, 4/7 bid. 3 cases dark amber biscuits, bought in. 1 case pieces, 4/11¼.
Witharagama	2 cases rough biscuits, 5/8.
Sirigalla	1 case good pale biscuits, 5/8.

Straits and Malay Straits.

L E MUAR STRAITS	40 cases fine clean para block, 5/11. 11 cases mixed mottled scrap and brown chip crêpe, 5/4. 21 cases fine para block (2 cases 5/10¾), 5/11. 4 cases fair mottled crêpe, 5/4¼.
B M & Co. P ''S	17 cases large pale and darkish amber sheets, 5/8½. 8 cases fair brown scrap, 4/6. 1 case rejected scrap, 4/5. 2 cases Virgin biscuits, 4/8. 5 cases nuggets and pieces, 4/5.
B B	2 cases mixed biscuits, bought in.

MARK.	QUANTITY, DESCRIPTION AND PRICE PER LB.
B R R Co. Ltd.	14 cases palish and dark rolled sheets, $5/7\frac{1}{2}$. 4 cases block good dark to black, $5/4$- $5/8\frac{3}{4}$. 8 cases fine pale crêpe, 5/9. 2 cases palish crêpe, $5/4\frac{1}{2}$. 5 cases mottled crêpe, 5/4. 4 cases dark crêpe, $5/1\frac{3}{4}$. 4 cases brown chip crêpe, 5/2.
Jebong	7 cases large darkish sheets, $5/8\frac{1}{2}$. 5 good pale crêpe, $5/9\frac{1}{4}$. 1 case mottled crêpe, $5/5\frac{3}{4}$. 2 cases scrap crêpe, 5/3. 1 case dark crêpe and blocks, $5/1\frac{3}{4}$.
S S B R Co. Ld.	5 cases large amber sheets, 5/8. 2 cases scrap good pale to darkish, 4/5 to $4/6\frac{3}{4}$.
V R Co., Ld. Klang F M S	12 cases rolled sheets mouldy, 5/8. 8 cases fine pale crêpe, $5/9\frac{1}{4}$. 2 cases Darkish crêpe, 5/7. 13 cases black block, $5/4\frac{1}{4}$.
K P Co., Ld.	27 cases sheets mixed colors partly mouldy, $5/7\frac{1}{2}$-5/8. 3 cases pressed pieces, $4/11\frac{3}{4}$. 7 cases palish scrap, $4/6\frac{1}{2}$-4/7.
Yam Seng	10 cases large amber sheets, 5/8. 10 cases dark scrap, $4/6\frac{3}{4}$. 2 cases Virgin pieces, $4/10\frac{1}{2}$.
S	6 cases large dull sheets, 5/8. 1 case pressed scrap, 4/7.
S P S	1 case brown scrap, $4/3\frac{1}{2}$. 2 cases palish and amber sheets, $5/8\frac{1}{4}$.
P S	1 case sheets, bought in. 2 cases inferior biscuits, bought in.
Sungie Krudda	2 cases rolled scrap, $5/0\frac{1}{2}$. 4 cases brown scrap $4/6\frac{1}{2}$. 7 cases large amber sheets, $5/8\frac{1}{2}$. 1 case white virgin slab, $4/6\frac{1}{2}$.
Linggi Plants Ld.	28 cases fine pale crêpe, $5/9\frac{3}{4}$. 3 cases brownish crêpe, $5/6\frac{1}{2}$. 14 cases brown block, $5/4\frac{1}{4}$.
C M R E Ld.	12 cases fine pale crêpe, 5/9. 3 cases dark mottled crêpe, bought in. 9 cases scrap chip crêpe, $5/1\frac{1}{4}$.
Gula	2 cases large amber sheets, 5/8. 1 case brown scrap, $4/7\frac{1}{4}$.
K	4 cases large palish sheets, 5/8. 3 cases brown scrap, $4/7\frac{1}{4}$.

West Indian Plantation.

W I R P S	1 case fine black castilloa, $4/4\frac{1}{2}$. 1 case good black scrap, $4/3\frac{3}{4}$. 1 case badly heated, 2/-

Fine Para, to-day's price, $5/1\frac{1}{4}$ per lb.

CEYLON, STRAITS, & MALAY STATES PLANTATION RUBBER REPORT.

March 1st, 1907.

The following were offered in auction to-day, and amount to about 31 tons Straits and Malay States, and about 8 tons of Ceylon. The largest weight yet offered.

Straits and Malay States.

MARK.	QUANTITY, DESCRIPTION AND PRICE PER LB
Telu Batu	
G K K B	16 cases brown unsightly sheets, 5/8¾. 1 case brown pressed scrap crêpe, 5/2½.
S & D	6 cases scrap crêpe, 5/2¼. 1 case chip pressed crêpe, 4/4. 3 cases good pale sheet, 5/9. 1 case scrap ball and rough scrappy sheets, 4/6¼. 2 cases good pale thin sheet, 5/8¾. 3 cases rolled scrap, 4/7¼. 1 case virgin biscuit, bought in. 1 case dark scrap rather heated and barky, 4/5½.
S P	
V R Co. Ld. Klang F M S	1 bag brown scrap crêpe thick, 5/2. 1 case chip crêpe, 4/6. 2 cases brown pressed scrap, bought in. 2 cases rough sheets, 5/8½. 11 cases good pale crêpe, 5/9¼ @ 5/10. 2 cases mixed crêpe, 5/6¾. 25 cases mottled crépe, 5/7 @ 5/7¾. 11 cases black block, 5/3½ @ 5/4¼. 4 cases grey block, 5/2 @ 5/2½.
S R Co.	34 cases sheets darkish rather rough, 5/8½ @ 5/8¾. 6 cases mottled crêpe, 5/6¼ @ 5/6¾. 2 cases mixed mottled crêpe, 5/5¾ @ 5/7. 15 cases black chip crêpe, 5/2¼ @ 5/3.
S	2 cases amber sheets, 5/8½. 1 case scrappy biscuit, 4/5¾
Yam Seng	10 cases large amber sheets, 5/8¾. 9 cases dark scrap, 4/7. 2 cases virgin pieces, 4/6½.
Highlands Est.	104 cases large darkish sheets (one lot 5/8¾) 5/8¼ @ 5/8½. 26 cases mottled crêpe, some pale, 5/6¼ @ 5/7½. 14 cases mottled crêpe darker, 5/4¼ @ 5/5. 17 cases black crêpe, 5/3½ @ 5/4½. 30 cases brown crêpe, 5/3 @ 5/3½.
Sungie Krudda	6 cases large sheets, bought in. 4 cases brown scrap, 4/6¾ 4 cases scrap and virgin pieces, bought in.
Glanrhos	8 cases dark amber biscuits, bought in. 2 cases rough sheets, bought in.
Clontarf	2 cases darkish amber biscuits, bought in. 1 case fair scrap 4/6½.
Kumbukkan	2 cases good amber biscuits, bought in. 1 case brown scrap, 4/7.
B R R Co. Ld.	14 cases dark amber sheets, 5/8.

MARK.	QUANTITY, DESCRIPTION AND PRICE PER LB.
P B R	22 cases dark pressed block (14 sold) 5/8½ @ 5/9¾. 2 cases good scrap, bought in. 1 case fair scrap, bought in. 1 bag red Rambong, bought in. 1 case cuttings and virgin, bought in.
T E P	1 case black chip crêpe, 4/8.
T E S	13 cases lumps and pieces, bought in. 10 cases low dirty pieces, bought in.
A M R C	1 case Virgin biscuits, bought in. 2 cases fair scrap, 4/7½.
C M R E Ld.	14 cases pale and palish crêpe, 5/8¾. 5 cases mottled crêpe, 5/7. 1 case brown chip, bought in.
Shelford	2 cases dark sheets, 5/8. 2 cases dark scrap, 4/6. 1 case cuttings and pieces, 4/8.

Ceylon.

Taldua	4 cases dark biscuits, 5/8¾.
Warriapolla	1 case fine pale Ceara biscuits, 5/9. 2 cases fine pale biscuits, 5/9¼. 2 cases fine darkish biscuits, 5/8¾ @ 5/9. 2 packages scrap, 4/6.
V B	1 case fair sheets, bought in.
Sunnycroft	1 case fine palish biscuit, 5/9. 2 cases pale scrap, 4/7½.
Ballacadua	2 cases mostly good, 5/9.
B B & Co.	1 case crêpe mixed pale and grey, bought in.
Various Marks	13 cases scrap dark (6 cases sold), 3/9½.
Culloden	3 cases palish crêpe, 5/9. 6 cases brown crêpe, 5/4½. 1 case black chip, 4/11.
Heatherly	3 cases fine pale biscuits, 5/9½.
Culloden	4 cases darkish biscuits, 5/8¾. 3 cases pale crêpe, 5/9¼ @ 5/9½.
Nikakotua	5 cases mixed colors sheets, 5/8½ @ 5/8¾.
Arapolakande	10 cases good darkish biscuits, 5/8¾ @ 5/9. 3 cases dark scrap, 4/6.
Ingoya	7 cases fine amber biscuits, 5/9.
Kumaradola	3 cases darkish amber biscuits, bought in. 1 case lumps and pieces, bought in. 1 case dark resinous biscuits, bought in
Elston C L	2 cases dark biscuits, bought in 1 case fair scrap, 4/5¾. 8 cases. mottled crêpe, 5/6. 16 cases brown crêpe, 5/2 @ 5/4. 3 cases black crêpe, 4/5½ at 4/9.
Suduganga	5 cases dark amber biscuits, 5/8.
Kepitigalla	2 cases pieces, 4/7½.

GOW, WILSON & STANTON, LTD., INDIA RUBBER MARKET REPORT.

13 Rood Lane, London, E.C. *February 15th, 1907.*

At to-day's auction, 464 packages of Ceylon and Malaya Plantation grown rubber were under offer, of which about 443 were sold. The total weight amounted to 25⅓ tons, Ceylon contributing nearly 3⅓, and Malaya about 22 tons.

There was good competition at about last sale rates for all kinds.

Several attractive parcels were included in the offerings, the most noticeable being two invoices from Lanadron Estate, Muar; of these about 4 tons were composed of very fine block rubber and realised the highest price of the sale, viz., 5/11 per lb., except two cases which brought 5/10¾.

Fine pale crepe was again in request from 5/9 to 5/9¼, one very fine parcel fetching 5/9¾.

Medium grades of crepe were slightly irregular, while dark sold well up to about 5/4 per lb.

Some very fine biscuits and sheet fetched 5/8½, the general price being 5/8 per lb.

QUOTATIONS.—

Fine block, 5/11.
Fine sheet, 5/7½ to 5/8½.
Fine biscuits, 5/8 to 5/8½.

Crepe:
- Very fine pale, 5/9¼ to 5/9¾.
- Fine pale, 5/9.
- Palish to darkish, 5/4 to 5/7.
- Dark, 5/1¼ to 5/4.
- Dark block, 5/4 to 5/4¼.

Scrap:
- Fine, 4/5 to 4/7.
- Fair to medium, 4/4 to 4/5.

PLANTATION FINE TO-DAY.—5/7½ to 5/11, same period last year, 6/1¼ to 6/2.

Do SCRAP.—4/4 to 4/7, same period last year, 3/8 to 5/4.

FINE HARD PARA (South American).—5/1, same period last year, 5/4¾.

AVERAGE PRICE OF CEYLON AND MALAYA PLANTATION RUBBER.

443 packages at 5/6½ per lb., against 238 packages at 5/11¼ per lb. same period last year.

Particulars and prices as follows:—

Ceylon.

MARK.	QUANTITY, DESCRIPTION AND PRICE PER LB.
Siragalla	1 case fine pale biscuits, 5/8.
Udapolla	1 case good biscuits, 5/8. 2 cases somewhat similar, 5/8. 1 case good palish to darkish biscuits, 5/8. 1 case fine pale scrap, 4/6¾.
We'Oya	2 cases find pale to darkish biscuits, 5/8¼.
Culloden	5 cases find amber biscuits, 5/8½. 9 cases very fine pale crepe 5/9¼. 1 bag palish, bought in. 6 cases fine darkish crepe 5/4¼. 1 case good darkish ditto, 5/3¼. 2 cases good dark, 5/2¾

MARK.	QUANTITY, DESCRIPTION AND PRICE PER LB.
Ellakande	3 cases good yellow biscuits, 5/8½.
Nikakotua	3 cases fine amber sheet, 5/8½.
J J V & Co.	2 cases good pressed scrap, bought in. 1 case fine, bought in. 1 case dark scrap, 4/5. 1 case good scrap, 4/7. 1 case good dark scrap, 4/7. 3 cases fine darkish biscuits, bought in. 1 case good rejections, 4/11¼.
Wiharagama	2 cases dull biscuits, 5/8.
KM	1 case good biscuits, sheet and scrap, bought in.
Ambatenne	1 case fine biscuits, 5/8¼. 1 case darker, 5/8. 1 case fine scrap 4/6½. 1 case dark scrap, 4/5¾. 1 case dark earthy scrap bought in.
Good View	1 case good biscuits, 5/8.
Waharaka	3 cases darkish scrap, 4/4. 1 case fine palish to darkish biscuits, 5/8.
Ballacadua	2 cases darkish crepe, 5/2. 2 cases fine palish to darkish biscuits, 5/8½.

Malaya.

MARK.	QUANTITY, DESCRIPTION AND PRICE PER LB.
B R R Co. Ld.	14 cases fine washed sheet, 5/7½. 1 case fine dark blocks, 5/8½. 8 cases fine pale crepe, 5/9. 1 case fine small blocks, 5/8¾. 2 cases fine palish scrap crepe, 5/4½. 5 cases darkish, 5/4. 4 cases good dark crepe, 5/1¾. 4 cases brown crepe, 5/2. 1 case dark block, 5/4
C M R E Ld.	12 cases fine pale crepe, 5/9. 3 cases good palish and darkish crepe, bought in. 9 cases good dark crepe, 5/1¼.
Jebong	7 cases fine amber sheet, 5/8½. 5 cases very fine pale crepe, 5/9¼. 1 case fine palish, 5/5¾. 2 cases fine darkish, 5/3. 1 case good dark, 5/1¾.
SSBRCo.Ld	5 cases fine amber sheet, 5/8. 1 case fine pale scrap, 4/6¾. 1 case darkish scrap, 4/5. 1 case pressed scrap (part uncured), 4/5¼.
S P S	1 case fine pressed sheet, bought in. 1 case good dark scrap, 4/3½. 3 bags rejections and scrap, 4/5¾.
P S	2 cases fine amber sheet, 5/8¼. 1 bag good ball scrap, 4/5. 1 case scrap and rejections, bought in. 2 cases pressed cuttings and scrap, bought in.
BNS	1 case good pale sheet, bought in. 1 case rejected biscuits, bought in. 1 case rejections, bought in. 1 case good scrap, bought in.
V R Co. Ld. Klang FMS	12 cases washed sheet, 5/8. 8 cases fine pale crepe, 5/9¼. 2 cases fine palish, 5/7. 13 cases dark smoked block, 5/4¼.
K P Co., Ld	18 cases fine palish sheet, 5/8. 1 case rejected sheet, 5/7¼. 2 cases scrappy sheet, 4/11¾. 5 cases fine scrap, 4/6½ to 4/6¾. 10 cases fine sheet, 5/8. 1 case scrappy washed sheet, 4/11¾. 2 cases fine pale scrap, 4/7.

MARK.	QUANTITY, DESCRIPTION AND PRICE PER LB.
Yam Seng	10 cases fine amber sheet, 5/8. 10 cases dark scrap, 4/6¾ 2 cases rejections, 4/10½.
R S R	6 cases fine amber, 5/8.
S S R	1 case fine scrap, 4/7.
GULA	2 cases fine amber sheet, 5/8. 1 case scrappy rejections, 4/7½
K	4 cases fine amber sheet, 5/8. 3 cases scrappy rejections, 4/7½.
Sungei Krudda	2 cases scrappy washed sheet, 5/0½. 4 cases good scrap, 4/0½ 7 cases fine amber sheet, 5/8¼. 1 case fine pressed undried, 5/6½. 2 cases good lump scrap, 4/5¾.
Linggi Plantns.	28 cases fine pale crepe, 5/9¾. 3 cases fine palish, 5/6½. 14 cases good smoked block, 5/4½.
L E Muar Straits	40 cases fine block, 5/11. 11 cases fine darkish crepe, 5/4. 21 cases fine block, 5/10¾ to 5/11. 4 cases fine darkish crepe, 5/[illegible]¼
B M & Co.	17 cases fine amber sheet, 5/8½. 8 cases good scrap, 4/6. 1 case dark lumpy scrap, 4/5. 2 cases rejections, 4/8. 5 cases mixed darkish scrap, 4/5.
P B B	2 cases good darkish biscuits, bought in.

GOW, WILSON & STANTON, LTD., INDIA RUBBER MARKET REPORT.

13 Rood Lane, London, E.C. *March 1st, 1907.*

At to-day's auction, 649 packages of Ceylon and Malaya Plantation grown rubber were under offer, of which about 562 were sold. The total weight amounted to about 37¾ tons, Ceylon contributing nearly 8, and Malaya nearly 29¾ tons.

The sale passed off with good competition for all grades, ¼d. to ½d. per lb. advance on last sale rates being sometimes recorded for the finer kinds.

There were several large invoices of fine washed sheet and crepe, amongst these being one from the Highland Estate amounting to nearly 13 tons, which was keenly competed for at from 5/3 to 5/8¾.

Fine pale crepe was also in request, selling up to 5/10 for finest, this being the highest price in the auction.

There was more enquiry for unwashed scrap, which marked an advance of about 1d. per lb.

QUOTATIONS.—

Good to fine block, 5/8½ to 5/9¾.
Fine sheet, 5/8 to 5/9.
Fine biscuits, 5/8¾ 5/9½.

Crepe:
- Very fine pale, 5/9¼ to 5/10.
- Fine pale, 5/8¾ to 5/9.
- Palish to darkish, 5/4 to 5/7¾.
- Dark, 4/11 to 5/3¼.
- Dark pressed and block, 4/4 to 5/4¼.

Scrap:
- Fine, 4/6½ to 4/8.
- Fair to medium, 4/5 to 4/6.
- Low, 2/9 to 3/9½.

PLANTATION FINE TO-DAY.—5/8 to 5/10, same period last year 6/- to 6/2.

Do. SCRAP.—4/5 to 4/8, same period last year, 4/3½ to 5/3½.

FINE HARD PARA (South American).—5/1¼, same period last year, 5/4½.

AVERAGE PRICE OF CEYLON AND MALAYA PLANTATION RUBBER.

562 packages at 5/5½ per lb., against 139 packages at 5/10¼ per lb. same period last year.

Particulars and prices as follows:—

Ceylon.

MARK.	QUANTITY, DESCRIPTION AND PRICE PER LB.
Glanrhos	6 cases good dark biscuits, bought in. 2 cases good palish to darkish biscuits, bought in. 2 cases good dull sheet, bought in.
Clontarf	2 cases good darkish biscuits, bought in. 1 case good darkish and dark crepe, 5/2¾. 1 case good scrap, 4/6½.
Kumbukkan	2 cases fine palish to darkish biscuits, bought in. 1 case good palish scrap, 4/7. 1 bag good lump scrap, 4/5¾.
Elkadua	1 box good pale Ceara biscuits, bought in.
Kumaradola	3 cases fine pale to darkish biscuits, bought in. 1 case lump scrap, bought in. 1 case dull Ceara biscuits, bought in. 1 bag dark scrap, bought in.
Elston	2 cases good darkish biscuits, bought in. 1 case good pressed, scrap, 4/5¾.
CL	8 cases good palish to darkish crepe, 5/6. 1 case somewhat similar, 5/4. 5 cases similar, 5/3¼. 3 cases good darkish rolled crepe, 5/3½. 7 cases good darkish crepe, 5/2. 2 cases dark pressed crepe, 4/9. 1 case black, 4/5½.

MARK.	QUANTITY, DESCRIPTION AND PRICE PER LB
Suduganga	3 cases good dull biscuits, 5/8. 2 cases similar, 5/8.
Kepitigalla	1 case scrappy sheet and biscuits, 5/7¼. 2 cases rejections, 4/7½.
Culloden	3 cases fine palish crepe, 5/9. 6 cases good palish and darkish crepe, 5/4½. 1 case good dark crepe, 4/11. 4 cases fine darkish biscuits, 5/8¾. 1 case very fine pale crepe, 5/9½. 2 cases darker, 5/9¼.
Heatherley	3 cases very fine pale and darkish biscuits, 5/9½.
Nikakotua	4 case fine palish to darkish sheet, 5/8¾. 1 case dark, 5/8½.
Arapolakande	9 cases fine dark biscuits, 5/9. 1 case lighter, 5/8¾. 3 cases fine pressed scrap, 4/6. 1 case dark block, 4/6¾.
Ingoya	7 case fine darkish biscuits, 5/9. 1 case fine biscuits and blocked sheet and biscuits, 5/6½.
J J V & Co. I	1 case low scrap, 4/5.
Taldua	4 cases fine palish to darkish biscuits, 5/8¾.
Warriapolla	1 case very fine pale Ceara biscuits, 5/9. 2 cases very fine pale and palish biscuits, 5/9¼. 1 case fine palish and darkish biscuits, 5/9. 1 case similar, 5/8¾. 1 case good scrap, 4/6. 1 bag darker and heated, 4/6.
C L P C	1 case Ceara biscuits and low scrap, 4/9.
V B	1 case fine amber sheet, bought in.
Sunnycroft	1 case good palish biscuits, 5/9. 2 cases good scrap, 4/6.
K M	1 bag scrappy biscuits, 4/8. 1 bag scrap and rejections, 4/8. 1 bag dull Ceara biscuits, 5/1.
Ballacadua	2 cases fine darkish biscuits, 5/9.
B B & Co.	1 case good palish to darkish crepe, bought in.
Heatherley	1 case earthy scrap, bought in.
Culloden	1 case earthy scrap, bought in.
Tudugalla	6 cases low scrap, part sold, 3/9½. 3 cases dark scrap, 3/4½.
PES	2 cases earthy scrap, bought in.

Malaya.

MARK.	QUANTITY, DESCRIPTION AND PRICE PER LB
Sungei Krudda	6 cases fine amber sheet, bought in. 4 cases good sheet, 4/9¾. 4 cases low scrap, bought in. 1 bag pressed virgin sheet, 4/3.
B R R Co Ld	14 cases good washed sheet, 5/8. 1 case good dark blocked sheet, 5/9¾. 6 cases good block, 5/9½. 7 cases good darkish block 5/8½. 8 cases good dark block, bought in.
C M R E Ld	14 cases fine palish crepe, 5/8¾. 5 cases fine palish to darkish crepe, 5/7. 1 case good dark crepe, bought in.
Shelford	2 cases good amber sheet, 5/8. 2 cases good scrap, 4/6. 1 case good scrappy rejections, 4/8.
SSBR Co Ld	5 cases fine amber sheet, bought in. 2 cases fine pale scrap, bought in. 2 cases good darkish, bought in. 2 cases dark pressed scrap (uncured), 4/6.
P B R	2 cases good scrap, bought in. 1 bag palish scrap, bought in. 1 case earthy scrap, bought in. 1 bag Rambong scrap, bought in. 1 bag cuttings, bought in.

MARK.	QUANTITY, DESCRIPTION AND PRICE PER LB.
Highland Est	11 cases fine washed sheet, 5/8¼. 5 cases similar, 5/8¼ to 5/8½. 7 cases fine palish to darkish crepe, 5/6¼. 4 cases darker, 5/5. 4 cases good darkish, 5/4½. 6 cases good brown, 5/4. 49 cases fine washed sheet, 5/8½. 5 cases similar, 5/8½. 13 cases fine palish to darkish crepe, 5/6¼. 10 cases little darker, 5/4¼. 7 cases dark, 5/3½. 17 cases good brown and dark crepe, 5/3½. 32 cases fine washed sheet, 5/8½ to 5/8¾. 4 cases darker and mouldy, 5/8½. 6 cases fine palish crepe, 5/7½. 3 cases good darkish to dark, 5/3¼. 1 case similar, 5/3. 9 cases good brown, 5/3.
T E P	1 case dark pressed crepe, 4/8.
T E S B	1 case low scrap, bought in. 12 cases similar, 2/9. 10 cases earthy scrap, bought in.
A M R C	1 case rejections, bought in. 2 cases good scrap, 4/7½.
V R Co Ld Klang FMS	2 cases good washed sheet, 5/8½. 10 cases fine pale to palish crepe, 5/9½. 2 cases good palish to darkish crepe, 5/6¾. 1 bag good washed sheet, 5/8½. 3 cases good palish crepe, 5/7¾. 6 cases dark smoked block, 5/4¼. 1 case palish, 5/2. 1 case fine pale crepe, 5/10. 18 cases fine pale to darkish crepe, 5/9¼. 1 case similar, 5/9. 4 cases good palish to darkish crepe, 5/7. 5 cases darkish smoked block, 5/3½. 3 cases palish, 5/2½.
S R Co.	21 cases good washed sheet, 5/8½ to 5/8¾. 3 cases good darkish crepe, 5/6¼. 1 case good palish, 5/7½. 1 case good darkish, 5/5¾. 10 cases good dark, 5/2¼ to 5/2½. 2 cases good brown, 5/2¾. 13 cases good washed sheet, 5/8¾. 3 cases good palish to darkish crepe, 5/6¾. 2 cases darker, 5/3. 1 case darkish, 5/4. 4 cases dark, 5/2½.
S R R	2 cases good amber sheet, 5/8½. 1 case rejections, 4/5¾.
Yam Seng	10 cases fine amber sheet, 5/8¾. 9 cases good scrap, 4/7. 1 case scrap and rejections, 4/6½. 1 case rejections, 4/6½.
Teluk Batu	16 cases fine amber sheet, 5/8¾. 1 case pressed darkish smoked crepe, 5/2½. 6 cases good blocked scrap crepe, 5/2¼. 1 case dark block, 4/4. 1 bag rejected sheet, 5/-.
G K K B	3 cases very fine pale amber sheet, 5/9. 1 case rejections and ball scrap, 4/6¼.
R S & D R	2 cases fine cut sheet, 5/8¾. 3 cases scrappy rejections, 4/7¼.
S P	1 case thick rejections, bought in. 1 case dark scrap, 4/5½. 1 case darkish pressed sheet, 5/8½. 1 bag scrappy crepe, 5/2. 1 bag dark pressed crepe, 4/6. 2 cases darkish, bought in. 1 case pressed sheet, 5/8¼.

Exports of Plantation Rubber from Ceylon.

From 1st January to 4th February.

1907	11½ tons	1905	2¼ tons
1906	9½ tons	1904	2½ tons

Exports from Singapore—1907, 1st to 28th January .. .. .. 36 tons

Malacca.

Abstract of Meteorological Readings in Malacca for the month of January, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Durian Daun Hospital	29·904	141·8	81·4	90·1	74·6	15·5	75·9	·789	62·6	68	N.W.	4·68	1·89

COLONIAL SURGEON'S OFFICE,
MALACCA, *4th March, 1907.*

F. B. CROUCHER,
Colonial Surgeon.

Malacca.

Abstract of Meteorological Readings in Malacca for the month of February, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Durian Daun Hospital	Barometer out of order.	139·0	78·9	86·2	74·0	12·2	76·2	·847	71·8	80	W.	1·29	1·10

COLONIAL SURGEON'S OFFICE,
MALACCA, *25th March, 1907.*

F. B. CROUCHER,
Colonial Surgeon.

Pahang.

Abstract of Meteorological Readings in the various Districts of the State for the month of February, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Kuala Lipis ...	...	...	...	92	62	20·32	...	...	...	...	...	·60	·19
Raub ...	...	...	...	90	64	16·19	...	...	...	...	...	3·95	2·76
Bentong ...	...	...	...	91	61	18·48	...	...	...	...	...	3·44	1·57
Temerloh ...	...	...	...	90	67	14·92	...	...	...	...	...	2·29	·97
Pekan ...	...	...	...	88	66	11·2	...	...	...	...	...	10·99	3·70
Kuantan ...	...	...	...	89	66	17·89	...	...	...	...	...	10·85	4·45
Sungei Lembing ...	...	...	...	86	62	15·6	...	...	...	...	...	7·31	2·03

STATE SURGEON'S OFFICE,
Raub, 14th March, 1907.

State Surgeon, Pahang.

Table showing the daily results of the reading of Meteorological Observations taken at the General Hospital, Seremban, for the month of January, 1907.

Date.	Temperature of radiation.										Wind. Direction.		Temperature of evaporation.			Computed vapour tension.			Relative humidity.			Clouds 0 to 10.			Cloud and weather initials.			Rain.
	9 H	15 H	Mean.	Maximum.	Minimum.	Range.	Sun.	Difference sun and shade.	Grass.	Difference shade and radiation.	9 H	15 H	9 H	15 H	Mean.	9 H	15 H	Mean.	9 H	15 H	Mean.	9 H	15 H	21 H	9 H	15 H	21 H	Inches.
	°	°	°	°	°	°	°	°	°	°			°	°	°	in.	in.	in.	°	°	°							
1	80	84	82	85	70	15	134	49	70	0	E.	S.E.	76.6	75.7	76.1	0.916	0.888	0.902	90	76	83	0	0	0	B	B	B	nil
2	76	80	78	81	70	11	125	44	70	0	S.E.	E.	74.3	76.6	75.4	.848	.916	.882	94	90	92	3	8	5	C	O	C	
3	80	89	84.5	91	70	21	140	49	69	1	E.	E.	76.6	72.7	74.6	.916	.801	.858	90	58	74	0	0	2	B	B	B	
4	80	90	85	93	70	23	143	50	69	1	E.	S.E.	76.6	72.1	74.3	.916	.784	.852	90	56	73	0	3	3	B	C	C	
5	80	88	84	90	70	20	143	53	69	1	E.	E.	76.6	73.7	75.1	.916	.833	.874	90	59	74.5	0	0	0	B	B	B	
6	80	87	83.5	89	70	19	143	54	69	1	E.	E.	76.6	74.3	75.4	.916	.847	.881	90	61	75.5	0	0	0	B	B	B	
7	83	84	83.5	86	72	14	139	53	69	3	S.E.	S.E.	73	74	73.5	.810	.840	.825	72	72	72	0	10	5	B	R	C	.85
8	76	84	80	85	72	13	140	55	67	5	S.E.	E.	72.6	74	73.3	.801	.840	.820	89	72	80.5	3	0	0	C	B	B	
9	78	80	79	81	72	9	116	35	65	7	E.	E.	71.2	69.9	70.5	.765	.732	.748	79	71	80	0	3	2	B	C	B	.10
10	78	81	79.5	82	68	14	141	59	66	2	E.	E	67.8	69.3	68.5	.681	.715	.698	71	68	69	0	0	0	B	B	B	
11	81	78	79.5	82	72	20	146	64	67	5	E.	E.	62.6	69.5	66	.576	.722	.649	53	75	64	0	3	2	B	C	B	
12	80	84	82	84	72	12	144	60	65	7	E.	E.	66.5	69.1	67.8	.650	.710	.680	63	60	61	0	0	0	B	B	B	
13	81	84	82.5	84	71	13	143	59	70	1	E.	E.	62.6	70.7	66.6	.576	.751	.663	53	64	58.5	0	3	c	B	C	B	
14	80	81	80.5	82	73	9	140	58	69	4	S.E.	S.E.	68	74	71	.690	.849	.769	67	80	73.5	0	3	2	B	C	B	
15	83	89	86	92	73	19	145	53	66	7	E.	E.	73	72.7	72.8	.810	.801	.805	72	58	65	0	0	0	B	B	B	
16	81	85	83	89	72	17	141	52	68	4	E.	S.E.	62.6	73.4	68	.567	.826	.696	53	68	60.5	0	5	0	B	C	B	.50
17	79	86	82.5	87	72	15	144	57	67	5	E.	S.E.	72.3	77.4	74.8	.793	.938	.865	80	80	80	0	5	0	B	C	B	.46
18	81	83	82	85	72	13	134	49	67	5	S.E.	S.E.	70.9	74.7	72.8	.757	.856	.806	72	76	74	0	3	5	B	C	C	.87
19	80	90	85	92	72	20	140	48	68	4	E.	E.	75	72.1	73.5	.867	.788	.827	85	56	70.5	3	0	0	C	B	B	
20	85	87	86	89	72	17	146	57	67	5	E.	E.	70.1	72.2	71.1	.738	.792	.765	61	61	61	0	0	2	B	B	B	.04
21	84	88	86	90	72	18	147	57	67	5	S.E.	S.E.	70.7	70	70.3	.751	.733	.742	64	55	59.5	0	0	2	B	B	B	
22	85	85	85	87	72	15	148	61	66	6	E.	S.E.	71.8	73.4	72.6	.781	.826	.803	64	68	66	0	0	0	B	B	B	
23	85	88	86.5	90	72	18	150	60	68	4	S.E.	S.E.	73.4	74.9	74.1	.826	.865	.845	68	65	66.5	0	0	2	B	B	B	.03
24	84	87	85.5	89	72	17	145	56	67	5	E.	E.	70.7	70.6	70.6	.751	.749	.750	64	58	61	0	0	0	B	B	B	
25	85	90	87.5	92	70	22	149	57	68	2	S.E.	S.E.	68.5	67.2	67.8	.698	.665	.681	58	47	52.5	0	0	0	B	B	B	
26	84	87	85.5	89	70	19	146	57	69	1	S.E.	S.E.	70.7	72.2	71.4	.751	.792	.771	64	61	62.5	0	0	0	B	B	B	
27	86	90	88	92	71	24	151	59	68	3	S.	S.	71.2	70.5	70.8	.763	.745	.754	61	53	57	0	0	2	B	B	B	
28	81	91	86	93	73	24	143	50	69	4	E.	S.E.	70.9	71.6	71.2	.757	.772	.764	72	53	62.5	0	0	0	B	B	B	
29	85	88	86.5	90	73	20	148	58	70	3	S.E.	S.	70.1	71.6	70.8	.738	.775	.756	61	58	59.5	0	0	0	B	B	B	
30	81	87	84	88	72	16	139	51	70	2	E.	S.E.	72.9	72.2	72.5	.802	.792	.797	76	61	68.5	c	0	3	B	B	C	
31	82	87	84.5	87	72	15	146	59	70	2	S.E.	S.E.	72	70.6	71.3	.785	.749	.767	72	58	65	0	0	0	B	B	B	

TOTAL ... 2.85

STATE SURGEON'S OFFICE, SEREMBAN,
16th February, 1907.

R. VAN GEYZEL,
Apothecary.

Register of Rainfall at Negri Sembilan Hospitals for January, 1907.

Date	Seremban.		K. Pilah.		Tampin.		Jelebu.		Port Dickson.		Mantin.	
	Inches	dcs.	Inches	dcs.	Inches	dcs.	Inches	dcs.	Inches	dcs.	Inches	dcs.
1	..	..	..	..	..	..	..	..	..	..	..	..
2	..	..	..	14	1	15	..	..	..	..	..	22
3	..	..	1	45	..	50	..	28	3	71	..	05
4	..	..	..	..	..	05	..	..	..	..	..	06
5	..	..	..	..	..	..	..	..	..	..	..	..
6	..	..	..	..	..	..	..	..	..	..	..	..
7	..	85	..	..	..	..	..	..	..	..	..	28
8	..	..	..	..	..	..	..	..	..	..	..	02
9	..	10	..	..	..	..	..	..	..	10	..	05
10	..	..	..	..	..	..	..	..	..	..	..	..
11	..	..	..	..	..	..	..	..	..	..	..	..
12	..	..	..	..	..	..	..	..	..	..	..	..
13	..	..	..	03	..	..	..	..	..	..	..	..
14	..	..	..	..	..	..	..	..	..	..	..	..
15	..	..	..	..	..	..	..	21	..	..	..	..
16	..	50	..	..	..	..	..	04	..	..	..	..
17	..	46	..	16	..	..	..	..	..	41	..	09
18	..	87	..	03	..	05	..	..	..	05	..	03
19	..	..	..	..	..	..	..	..	..	..	..	..
20	..	04	..	..	..	..	..	..	..	..	..	20
21	..	..	..	..	..	..	..	04	..	..	..	..
22	..	..	..	..	..	..	..	..	..	..	..	07
23	..	03	..	..	..	..	..	..	2	19	..	03
24	..	..	..	..	..	..	..	..	..	..	..	..
25	..	..	..	..	..	..	..	..	..	..	..	..
26	..	..	..	..	..	..	..	..	..	..	..	..
27	..	..	..	..	..	..	..	..	..	..	..	..
28	..	..	..	..	..	..	..	..	..	..	..	..
29	..	..	..	..	..	..	..	60	..	..	..	..
30	..	..	..	66	1	75	1	30	..	..	..	15
31	..	..	..	..	..	..	..	03	..	..	..	..
Total	2	85	2	47	3	50	2	50	6	46	1	25

STATE SURGEON'S OFFICE, SEREMBAN,
16*th February*, 1907.

R. VAN GEYZEL,
Apothecary.

Singapore :

KELLY & WALSH, LIMITED, PRINTERS,

32 RAFFLES PLACE AND 194 ORCHARD ROAD.

1907.

TAIPING, PERAK, *23rd April,* 1907.

FOURTH JOINT ANNUAL AGRI-HORTICULTURAL SHOW.

SIR.—I am instructed by my Committee to inform you that the Fourth of the large Exhibitions of Agri-Horticultural and Native Industries will take place in Kuala Kangsar, Perak, on the 9th, 10th and 11th August next.

It is hoped that you will make the date of the Show as widely known in your district as possible and that exhibits will be as numerous and excellent as formerly.

The competitions are restricted to exhibits from the Federated Malay States and the Straits Settlements.

Prizes are offered for all kinds of Agricultural Produce, Cattle, Poultry, Flowers, Ferns, Ornamental Plants of all kinds, Fruits and Vegetables, Jungle Produce, such as Rattans, Damars and Native Drugs, and all kinds of Native made Articles, of which, on previous occasions, there has been a very extensive exhibition.

The competition in Plantation Rubber is expected to be larger and keener than ever and it is hoped that your district will be well represented. A number of valuable Cups will be offered in this and other sections of the Show.

Copies of Prize Lists and other literature can be obtained from the Honorary Secretary of the Standing Committee for your State, to whom you should apply for all further particulars.

I have the honour to be,

Sir,

Your obedient Servant,

T. W. MAIN,

Hon. General Secretary.

The Hon. Secretary,
Singapore.

AGRICULTURAL BULLETIN

OF THE

STRAITS

AND

FEDERATED MALAY STATES.

No. 5.] MAY, 1907. [Vol. VI.

AFRICAN RUBBER-VINES.

The story of the African Rubber-vines is the subject of a paper by M. E DE WILDEMAN in the *Notes sur les plantes ute de la Flore du Congo*, Vol. II, fasc. p. 5. He gives an account of the discovery and exploitation of the rubber-vines of the Cameroons from M. WALDAN, Extinction of African Rubbers (*India Rubber World* Jan. 1, 1905). M. WALDAN discovered Landolphias wild in abundance in the mountains, and taught the natives to collect the rubber warning them against destroying the vines.

As might be expected they paid no attention to this latter recommendation and in three years all the vines in the mountains were destroyed. The same thing has happened in other parts of Africa, and M. WALDAN thinks that in 15 years the exportation of rubber from Africa will be trivial, the forests being destroyed. M. WILDEMAN does not agree with this because many young vines and Funtumias will be left which will develop later, and also many of the vines cut down will shoot up again. This may be so but one must remember that the destruction of the upper parts of the Landolphias must destroy the fruit and prevent the rapid reproduction of the plant. Exactly the same thing would happen to the Landolphias as has happened to rattans in many places near a populated district. The rattans being constantly cut before fruiting have practically disappeared. *Willughbeia firma* the Akar Gegrip of the Malays represents the African Landolphias and produces rubber quite as good. What has happened to this plant here? It has by no means been exterminated though in time gone by the vines were sought by Dyaks and Malays for the rubber. In former years Malays used to take passes to collect this rubber in the Government forests, but in spite of the high price of rubber one hears of very little *Willughbeia* rubber being collected now. The plant is by no means rare, but it is too scanty to be worth while seeking for.

M. WILDEMAN quotes M. BOOTH'S paper *Eoniges Über Landolphia* in the *Tropanpflanzer* (Dec. 12, 1905), in which he proposes as the only way to preserve the vines against irrational exploitation

is to reserve the richest rubber regions, and if the natives have invaded these regions to clear them out. To make, in fact, forest reserves for Landolphias as has been done in the Malay Peninsula for Gutta percha and put them under the management of Europeans. The return given by these vines is however, very small. A three or four year-old Landolphia gave to Mr. BOOTH a ball of rubber about 1½ inch through and he says an energetic and skilful rubber collector can hardly collect 9 such balls in a day, 30 to 35 of which make a pound. Six year-old vines gave four balls, but then the old stems after milking it appears very apt to die.

This certainly does not seem very promising.

A Dutch planter M. SEEMBRUGGEN in *Tijdschrift voor Negverheeid en Landboow,* Batavia, June 1906, discusses the cultivation of *Willughbeia* in Java. He considers that rubber trees can only be cultivated by people who can afford to wait many years, while rubber-vines can be more quickly grown. Our experience in the Straits is that rubber vines are much slower to give a return than rubber trees. But that the rubber must be obtained by mechanical methods from the vines. Apparently by beating the bark on blocks of wood. He describes the method of cultivating *Willughbeia* which not being a native of Java would have to be introduced from Sumatra. The objection raised by some people that this introduction, cultivation and preparation would be too costly, he meets by saying that all these introductions are costly and slow. All the *Castilloa* in Java was raised from one plant, *Hevea braziliensis* from some few seeds. *Willughbeia firma* need only be introduced once. One could make innumerable marcottes, and from the plants too one could obtain a large quantity of fruits, which he says are good eatable fruits. As a matter of fact *Willughbeia firma* is not at all easy to reproduce by marcotting. It takes very many years to fruit. Bushes of it cultivated in the Botanic Gardens for about twenty years have certainly flowered regularly, but only once or twice produced one or two fruits. *Landolphias* have fruited here more easily but their seeds do not germinate. Recently I saw in Malacca a very small plantation on extremely bad soil belonging to a Chinaman who had some years ago borrowed enough money to plant a few trees of Para rubber. He planted too some *Willughbeias.* From the latter now grown into fairly large clumps he obtained nothing nor was there any likelihood of his ever getting any rubber from them. From the Para rubber he was making a good profit. It might be possible to cultivate rubber-vines profitably, but at present it seems very improbable. Their habit of producing numerous small stems from which it is difficult to get any rubber at all, and their very slow growth, militate considerably against their ever playing an important part in the production of the world's rubber supply, after the easily accessible forests in which they occur wild, have been exploited.

H. N. RIDLEY.

FUNTUMIA ELASTICA FLOWERING IN JOHORE.

Funtumia elastica is not a tree that has so far done very well in the Malay Peninsula. It seems to be unsuited to our soil and climate, and is very badly damaged by caterpillars. Recently however, I saw quite a fine little tree in a garden belonging to Rajah HITAM NONGCHIE of Johor, which had attained a height of about 12 or 14 feet and a girth of stem of a foot. Its leaves were larger and deeper green than one usually sees them and quite free from the attacks of caterpillars though a neighbouring plant had been badly attacked and was stunted in growth. The tree had also produced flowers, and when I saw it was producing a fresh crop of buds. It had not fruited. The soil it was growing in was very sandy and dry.

H. N. RIDLEY.

LE CAOUTCHOUC EN INDO-CHINE.

This is a nicely illustrated work of 260 pages by Messrs. C. and A. SPIRE on the native rubber plants of French Indo-China. It commences with descriptions and figures of *Ecdysanthera rosea, Parabarium Tournieri, P. latifolium, P. spireanum, P. Quintareti, P. napeense, P. verneti, P. linocarpum and others Parameria glandulifera, Aganonerion polymorphum, Michrechites Jacqueti, Xylinabaria Reynaudi X. minutiflora* and *X. spirei. Chonemorpha grandieriana, C. Megacalyx, C. Griffithii, Nonettea cochinchinensis, Amalocalyx microlobus, Rynchodia Capusii, Aganosma Harmandiana, Melodinus Tournieri, Bousigonia mekongensis*, and *B. angustifolia, Pottsia cantonensis,* several species of *Ervatamia, Holarrhena Ichnocarpus frutescens.*

Many of these are hardly to be classed as rubber-vines as their product is poor and scanty. The *Parabariums*, seem to give good rubber, which on analysis of several kinds give 82·22 to 88·45 per cent. pure rubber of good quality.

Chonemorpha Griffithii, a plant which occurs on Penang hill gave 90·05 but its rubber was sticky and evidently very poor stuff. The *Xylinbarias* and *Nucrechites,* are the species recommended to be propagated. There is some difficulty in preventing the Annamites from destroying the vines by cutting them to death and as the vines are smaller than Landolphia and very twisted it is difficult to tap them or to remove the bark without injury. The treatment of the bark by pounding in a mortar also used for Landolphia at Brazzaville.

These rubber-vines do not seem really very inviting as cultivated plants. Those we have in the Peninsula *Chonemorpha Griffithii, Pottsia cantoniensis* (a very weedy thing) *Paramerias, Ecdysantheras Ichnocarpus frutescens,* are slow growers, and never seem to attain any great size. *Willughbeias* and *Urceolas* a more likely group of

rubber producers do not seem to occur in the country. Some of the rubber trees however have been introduced *Hevea braziliensis*, introduced in 1891, disappeared soon afterwards. It has however been reintroduced and seems to do well in the region south of Annam and can be tapped in six years. Ceara rubber does not seem able to stand the dry season, at Saigon nor the cold of Hanoi. Castilloa introduced in 1889 disappeared in 1900. *Ficus elastica*, is indigenous in Annam and seems to offer the best hope of French Indo-China becoming a rubber producing country.

H. N. RIDLEY.

MALAY DRUGS.

The papers published on Malay drugs in the Bulletin last year have been translated into Dutch by Dr. GRESHAFF of the Koloniaal Museum, Haarlem, and published in *De Indische Mercuur*, under the title *De Inlandsche Geneesmiddelen de Maleiers*.

H. N. RIDLEY.

FRUITING OF THE FRANGIPANI (PLUMIERA).

The well known plants of the Genus *Plumiera* commonly called Frangipani are natives of South America with one or two in Africa and Madagascar, about fifty species are recorded but only about eight are in cultivation. The best known of these is *P. acutifolia* which is cultivated ev ry where, and especially in grave-yards, where very large specimens may often be seen. It has white flowers with more or less pink backs.

P. rubra is easily distinguished by its beautiful rose-coloured flowers. It is not very common, in cultivation in the East, having been introduced comparatively lately.

These plants do not as a rule fruit very readily. It is quite rare to see. *P. acutifolia* in fruit common as it is here, *P. rubra* however seems to fruit more easily.

Mr. MACHADO has lately sent seeds from Kamuning Estate, and it is fruiting too in the Botanic Gardens. The fruit consists of two follicles rather thick, and cylindric spreading out widely apart like buffalo horns. The seed is about an inch long flat and oblong from its rather broad dry brown wings.

H. N. RIDLEY.

Bibliography.

We have received a copy of the account of the Ceylon Rubber Exhibition published as the first of a series of Peradeniya manuals under the title of Rubber in the East, an official account of the

Ceylon Exhibition. The account is a full one of the exhibition and the discussions on various points of Agricultural work in Ceylon and the speeches at the dinner that followed.

The work is illustrated by photographs of the various people connected with the show, the exhibition-pavilion, and some of the exhibits and machinery, and there are also maps showing the distribution of rubber plantations in some parts of the Malay Peninsula. The book contains a good deal of interesting information and is nicely got up.

H. N. RIDLEY.

THE OIL-GRASSES.

The Kew Bulletin No. 8 of 1906 which has just appeared is occupied by a very interesting article by DR. STAPF on the oil-grasses of India and Ceylon. The history of these grasses and their synonymy hitherto terribly confused has been very carefully worked out, and the correct names definitely settled. Twelve oil yielding grasses are known of which ten belong to the genus *Cymbopogon*, (formerly often included under *Andropogon*) one species of *Vetiveria* and one species of *Andropogon*, only four kinds however are worked commercially.

Cymbopogon Schœnanthus. The Camel hay is an Arabian species, formerly used by the Romans and Greeks for flavouring wine, and in medecine, and it has been found mixed with other plants laid as offerings in the form of funeral wreaths on the Sarcophagi of the King's of Thebes, entombed between 1200 and 1000 B.C. A little of its oil appears to be made in the Punjab, but it has been quite neglected in commerce for several centuries.

C. Iwarancusa, is a native of Northern India, and nothing much is known of its use except medicinally being used by natives of that part in fever, hence its name Jwara-ancusa, lit. fever restrainer.

Cymbopogon Nardus is the well known Citronella grass, which is a native of Ceylon, and appears to have been known by the end of the sixteenth century, being cultivated near Colombo. Later writers confused it with Lemon-grass and Malabar-grass, but the confusion has been unravelled. It is first mentioned as cultivated in the Malay Peninsula in Penang in 1872, by GLADSTONE in a paper in the Journal of the Chemical Society. In Java it appears only to have been introduced in 1891, but this may be doubted, as the plant is well known to all the Malay races, under the name of Serch wangi. It is however only used medicinally, being too strong for eating or flavouring purposes, for which Lemon-grass is used.

Two kinds of Citronella grass are known, *viz:* Maha Pengiri and Lenabatu or Lana Batu Pengiri. The former is apparently the plant grown here. It is described as a surface feeder which soon

grows out of the ground and gets exhausted dying off after 10 o 15 years' cultivation, the leaves are somewhat broad and the bushe formed are larger than that of the Lena batu.

The oil is finer containing 50·45 per cent. of citronella and 38·15 of geraniol as against 28·2 of citronella and 32·9 of geraniol in Lena batu. The latter however requires replanting less frequently and so is said to be replacing the former.

C. confertiflorus is a native of Ceylon which is said to produce a good oil, but it does not appear to have ever been used commercially.

C. flexuosus is a Malabar species which produces the Malabar grass oil or Malabar Lemon-grass oil. It is distilled and exported under the name of Lemon-grass oil but it is not to be confused with the real oil of that name.

C. coloratus is a smaller plant from Southern India of which little is known. It is very aromatic but does not appear to be distilled.

C. citratus.—The Lemon-grass. The origin of this plant seems very obscure. It appears to have been first described in 1631 in Java by BONTIUS and 1635 in the Philippines by MEREINBERG, a Spanish Jesuit. Since that time it has been carried all over the world.

It appears in India in 1695, in Africa and America about the beginning of last century. Its value in medicine and its invariable use in Malay curries, no doubt caused its transportation all over the Archipelago and to other countries where the Portuguese who highly appreciated it, made their colonies. It is interesting historically to find that Queen CHARLOTTE was very partial to Lemon-grass tea, the plant being grown at Kew. She frequently treated Dr. MATON her physicion to a dish of Lemon-grass tea from the Kew plants.

No one seems ever to have seen the plant wild, so that its original home is quite unknown. The plant very rarely flowers. I have never seen or heard of flowers here, but they have occasionally been met with elsewhere. It is known here as Sereh Makan, to distinguish it from Citronella Sereh Wangi.

C. Martini is an Indian species producing the Rusa oil or Geranium-oil, an oil in much demand. The production amounts to 44,080 lbs., chiefly produced in Khandeish and Rajputana.

C. coesius, Kamakshi grass replaces this last in the Carnatic Its oil seems to be locally used, but has never been made commercially.

C. polyneuros known as Delft grass, is found in the Nilghiris and Ceylon. Its oil seems never to have been made commercially.

The Vetiver, *Vetiveria odorata* to which the new name of *V. zizanioides* is given, is well enough known. It is a native of most of India and Ceylon and turns up in the Malay region occasionally in gardens. The roots when damp exhale a pleasant scent. The oil is seldom if ever extracted.

Andropogon odoratus the Usadhana, produces a yellow oil with a scent of cassia and rosemary. It is a native of Phana in India, but little seems to be known of it.

The whole paper which is illustrated by a figure of the Lemon-grass in flower is well worthy of the attention of planters and consumers and manufacturers of grass oils.

H. N. R.

CYANOGENESIS IN PLANTS.

The researches on this important subject are being continued by Professor DUNSTAN, Dr. HENRY and Dr. AULD, and we have received a continuation published in the proceedings of the Royal Society dealing with the production of the cyanogenetic glucoside, Phaseolunatin in the common flax and also in Tapioca. There are two kinds of Tapioca-plants known and used to provide the starch known as Tapioca, Manioc, Cassava Mandioca and by other names, of these one is known to be intensely poisonous unless cooked. This is the bitter Cassava. It has long been cultivated in Singapore in the Botanic Gardens and is a very distinct looking narrow leaved plant. It is the manihot utilissima of Botanis s. This bitter Cassava is the only kind used in South America at least in Pernambuco, as the natives did not care about the sweet Cassava. It is there the staple food of the country and is eaten in a variety of ways. The roots are rasped and then ground up to a fine flour, and scalded with boiling water, which destroys the glucoside and makes the food harmless. It is eaten in the form of this powdered stuff and more resembles sawdust than any thing else, or boiling gravy is poured over it and it is made into a mass like pease pudding or scalded and rolled out into thin white sheets it is eaten as bread, and this form is known par excellence as tapioca.

This bitter Cassava has never found favour with the oriental races. It was frequently distributed to various planters from the Botanic Gardens in times gone by but never came into cultivation, and there are probably very few plants in the Peninsula. The sweet Cassava has been regarded as a cultivated form of this bitter one, but POHL a Brazilian botanist regarded it as distinct in which he is undoubtedly right and named it *Manihot Aipi* although this the common tapioca of the East does contain the glucoside it is chiefly in the rind of the root and not dispersed through the whole root as in bitter Cassava, and is in such small quantities that it is harmless, and the cooking of the roots or flower destroys the little poison that is left.

H. N. R.

VITALITY OF PARA RUBBER.

Mr. LE DOUX of Nelson Rubber Estate Johor, writes "In our tapping block (8 year-old trees) there is a tree in the middle of a girth of 12 inches at three feet from the base. This tree has been tapped on two sides. Its leaves are of the same colour and size as its neighbours'. Four years ago this tree was completely ringed 4 inches from the base and the wood cut into all round for an inch and a-half deep. With a moderate shove it would break off. The thin bit of wood which connects the main trunk to the base is ròtten and black in colour. There is not a hair's breadth of bark between the sections. Despite all this the tree has lived for four years looks healthy and yields latex."

This is certainly curious, the water supply for the trunk must be obtained through the small piece of remaining wood. One knows here how in girdling a tree to kill it, it is necessary to cut well into the wood, as merely removing a strip of bark is not necessarily fatal, but one would hardly imagine that a tree cut as this one has been would continue living.

H. N. RIDLEY.

In a later letter M. LE DOUX adds further details. The diameter of the tree at 3 feet from the base is 11½ inches at 6 inches, 17½ inches and at 2 inches from base 16½ inches. The bark curves in slightly at the base of the upper section of the trunk and has a number of bumps there. The tree has 12 tapping cuts on one side and six on the other. These are being covered with new bark. Last tapping was in October, 1906, and the cuts are healing. The bark yields latex in both sections and appears as good and abundant as that of other trees of the same size. A photograph brought by Mr. RICE shows that the tree has been almost cut through. It was intended to cut it down and it was cut round all through when for some reason the cooly stopped and the tree was forgotten. It is really a most remarkable instance of the vitality of Para rubber.

H. R. N.

RUBBER.

MALAYA STILL LEADING.

Wednesday, 16th January.

In a communication to the Press of Ceylon, Messrs. LEWIS and PEAT, the well-known produce brokers of Mincing Lane, draw the attention of planters to a falling-off in the preparation of Ceylon biscuits and sheets compared with what it was when the firm advised them to continue to ship their produce in one or other of these forms. They state that recently numerous marks have suffered severely in price in consequence of their roughness and black colour, and in many cases mouldy and resinous surfaces, upon their arrival in

London. This defect, say Messrs. LEWIS and PEAT, arises from want of care in curing—whether from want of factory space, or from hurrying—and that imperfectly cured lots deteriorate on the voyage home and fermentation goes on, resulting in the resin exuding and spoiling both biscuits and sheets. "That this can be avoided is proved by the high standard maintained by such marks as Culloden, Heatherley, etc., from Ceylon; Bukit Rajah, Selangor, Pataling, Jebong, etc., from the Straits and F. M. S."

BLOCKS THE BEST.

"Of course, the Lanadron block leaves nothing to be desired; but everyone is not as yet in a position to block their rubber, and as a difference in price varying from 3*d*. to 6*d*. per lb. has often of late been made between fine biscuits, sheets, etc., and the dark discoloured and inferior lots, we venture to suggest that, as manufacturers have more or less got over their prejudice against crepe rubber, planters should send it home in this form, and, we think, they will greatly decrease the evil referred to. In other words, it is much better to send home good crepe than bad biscuits or sheets. Good scrap crepe is also realizing excellent prices and chip crepe up to and over 4*s*."

IMPORTANT FORECAST.

Continuing, Messrs. LEWIS and PEAT say:—Recently, with larger supplies, buyers have been discriminating much more, and we find 5*s*. 6*d*. @ 5*s*. 8*d*. being paid for fine pale biscuits and sheet against 5*s*. 2*d*. @ 5*s*. 4*d*. for inferior dark and mixed lots, while fine pale crepe has brought 5*s*. 8*d*. @ 5*s*. 10½*d*. and fine pale Ceara biscuits up to 5*s*. 7¾*d*. Scrap have been very irregular but much dearer than it was formerly, although we do not understand buyers paying the prices they have for this kind, whether the quality was good, bad, or indifferent. We do not think this will continue, but a difference of 6*d*. @ 1*s*. per lb. will be established later on between common and good.

DEMAND STILL ENORMOUS.

Finally, this eminent firm draw attention to the fact that, as was inevitable with the increase of supplies of plantation, the price has come nearer the price of fine Amazon smoke-cured Para which continues firm at 5*s*. 2*d*. per lb., although very fine pale lots of plantation, which have sold for colour, still realize 6*d*. @ 8*d*. per lb. above the price of fine Para. "The Amazon crop promises to show an increase this season, but, in spite of this, the demand is so enormous that there is no decline in price, and the heavy supplies are absorbed as soon as received.

THE MARKET IN 1906.

From a diagram issued with the India Rubber Journal it appears that the highest point reached by plantation rubber in 1906, was 6*s*. 3¼*d*. at the end of March and the early part of April, since which time the fall has been steady and almost uninterrupted until

it stands at 5*s.* $5\frac{1}{4}$*d.* In 1905 plantation rubber commenced the year at 6*s.* $0\frac{1}{4}$*d.*, touching 6*s.* 10*d.* in May and finishing up at 6*s.* 2*d.* in December. Fine hard para has also suffered similarly. Starting the year at 5*s.* $4\frac{3}{4}$*d.* it has gone down to 5*s.* $0\frac{3}{4}$*d.* and, as the "Times of Ceylon" remarks, ended the twelve months at 5*s.* $2\frac{3}{4}$*d.* In 1905 fine hard para commenced at 5*s.* 1*d.* rose to 5*s.* $9\frac{1}{4}$*d.* and after touching 5*s.* 2*d.* at the end of October recovered to 5*s.* $5\frac{1}{4}$*d.* by the 31st of December.

Present Value.

Messrs. LATHAM & Co., Singapore, have advices to the effect that during the current month there has been an improvement in the London auction prices, 5/6 to 5/7½ being the quotation on the 4th instant, with the market strong; Singapore quotation $285 to $300 on same date.

Exports in 1905 and 1906.

From Singapore (1905) 57,426 lbs. were exported; in 1906 about 500,000 lbs. From Penang (1905) 29,600 lbs.; in 1906 about 80,000 lbs. Ceylon exported 89,095 lbs. in 1905, while in 1906 there was an increase of 129,051 lbs.

(Times of Malaya.)

GATHERING CAPSULES OF PARA RUBBER.

The Manager of the North Borneo Trading Company writes from Sandakan as follows.

THE NORTH BORNEO TRADING CO., LIMITED.

Sandakan, January 10th, 1907.

H. N. RIDLEY, Esq.

Singapore.

Dear Sir,—Referring to mine of the 1st ultimo, I shall be glad to know if the seed contained in the mature but unburst capsule of Para Rubber is just as suitable for planting as the seed collected after the capsule has burst.

The pigs eat a great number of the fallen seeds, and large numbers are lost by the seeds being thrown into the river and the long grass on the banks when the capsule explodes.

If it is feasible to collect from the trees, and artificially open all mature capsules with the certainty that the trees obtained from seed obtained in this way will be just as vigorous, large losses of seed could be obviated.

We are experimenting with a view to learning if the seed thus gathered will produce strong seedlings: at present we have not had time to judge results.

I have, etc.,

G. WELMAN.

It is certainly quite possible to collect capsules of rubber seed quite ripe and either to crack them or allow them to explode of themselves in a closed space. One year we collected the greater part of the crop in this manner, the capsules were pulled off the trees with a sharp edged iron hook on a long stick and the capsules were then cracked frequently they exploded when touched and often in falling or when they reached the ground. The important thing is of course that the coolies should only pull the ripe fruit ready to explode. When the capsule is ripe the green husk turns blackish and begins to wrinkle, then splits and retracts exposing the white husk after a little supervision the coolies soon learn to make no mistakes in pulling the fruit after the husk has begun to shrink. It would probably be best to allow the seed to explode of themselves in a closed space so that any that were not quite ready would dry a little.

H N. R.

ON A SYSTEM OF LAYING OUT ESTATES IN 10-ACRE BLOCK.

In compliance with the terms of a certain Government Grant I had once to submit to the tiresome task of planting a considerable area of Rubber in jungle without previously clearing it. By mere chance I decided on running long parallel rentices through the whole block, 33 feet, *viz.* ½ chain apart; for the sake of better intercommunication I can crossrentices through them at right angles, the latter 10 chains apart. This led to the land being practically cut up into 10-Acre blocks. For the sake of uniformity I continued this on some adjoining land which was opened up in the orthodox fashion, felled, burned and cleared. I have since done the same on new land and gradually improving in details I have found this system to be so suitable and show such a number of feature which make it superior to any other I have heard of that I may be allowed to publish my experience for the information of fellow planters. I do so all the more readily because I have never heard of anyone opening land in this way, neither here nor in Ceylon; in the latter place I was told of some planters cutting up their land into 30 or 50-Acre blocks, but I venture to say that the 10-Acre system is by far the more useful.

I shall explain in which way I have lately opened up new blocks of jungle alienated from Government. Assume the land to have the shape as per the sketch below containing approximately 500 Acres. The principal thing is to find or make a base-line; any line, running more or less at a tangent to the block, is suitable; it need not touch the block, but it must not cross (into it) any part of it, otherwise complications will arise with regard to the naming of the different fields. In this country our new blocks are mostly such

that almost any of the boundaries may serve as a base-line; I always use one surveyed by Government and clearly marked with stones so whatever may happen, as long as the base-line is fixed the whole co-ordinate system may be reconstructed on it.

In the attached plan I would chose X-Y as my base-line; as soon as it has been properly cleared, pegs are put in along it correctly 10 chains apart, starting at X. On the point marking the last 6th length of whole 10 chains the right angle-line, Y-Z is put in, if possible with a theodolite; prismatic compasses are sometimes unreliable and as this is the one line which cannot be checked it is as well to take some trouble in getting it accurately at right angles to base-line.

On this second line lengths of 10 chains are again marked and the rest is detail work which cannot only be easily done by any man conversant with a prismatic compass but which can also be easily checked and amended by taking and measuring frequent cross-shots to either base-line or right-angle-line, or to the last paralled line to these two which has been checked previously.

The main difference between these two important lines is that from the base-lines all shots will have to go in one direction whereas from right-angle-line rentices start towards right and left.

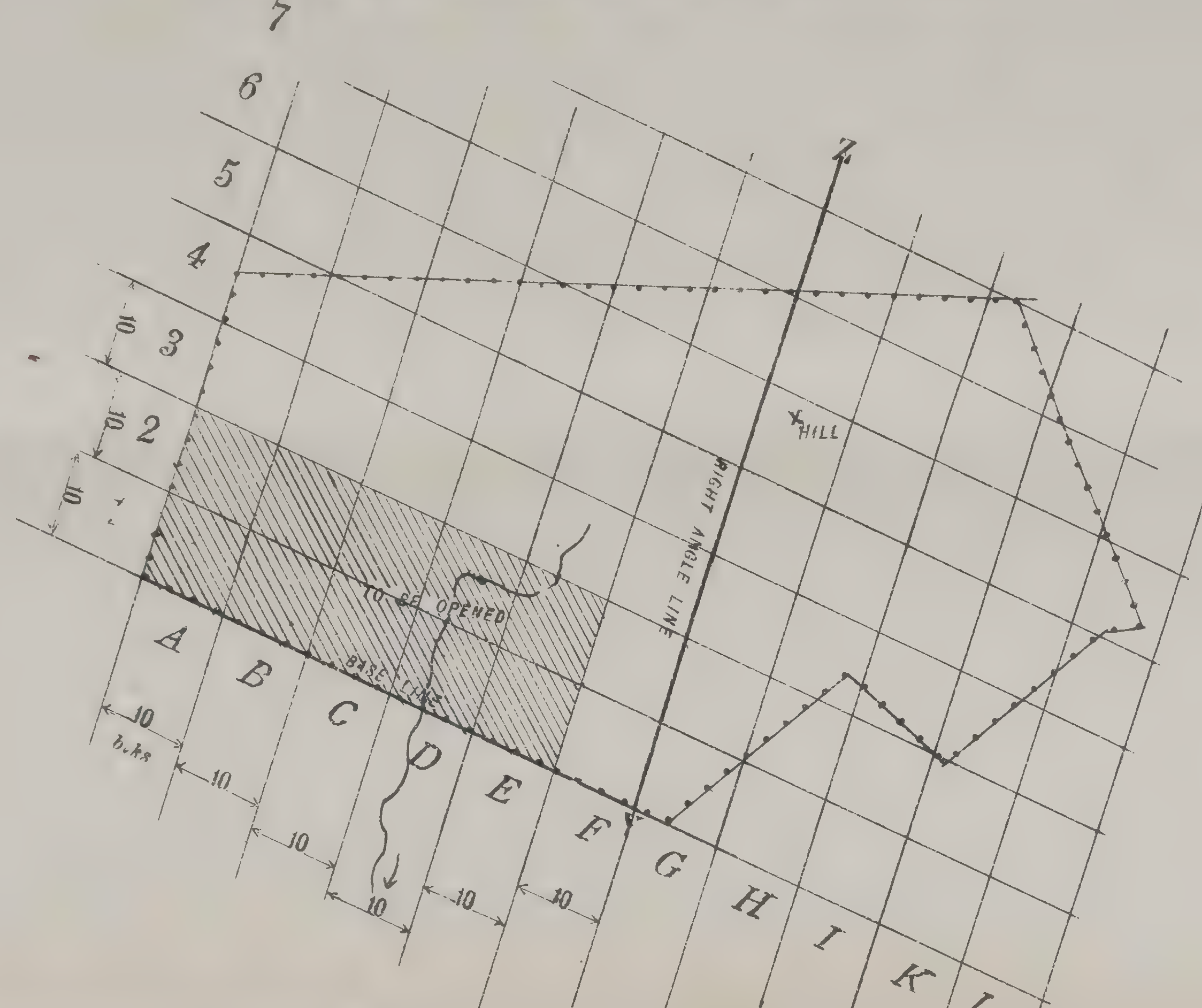
In laying out a block of jungle it is of course essential that the crossing points of any two rentices indicating, as they do, one of the four corners of any 10-acre blocks, should be well marked. Pegs and posts, however big, are not safe as they can entirely disappear in felling and burning. I found a strong peg rammed flush with the ground and covered with 3-6 big stones to answer well, contractors having been asked not to fell trees across the rentices. In land where it is hard to get any stone I am having a strong peg put in the bottom of a 3 ft. × 3 ft. × 3 ft. hole. In flat land which has to be thoroughly drained I fancy that drains could advantageously be made to take the place of dividing rentices.

It is, of course, by no means necessary to lay out the whole of a big estate in this way; in the attached sketch for instance, according to which it may be proposed to open a 100-acre field, all that is required is the "base line" and part of the "right-angle-line"; further 20 chains each between A, B, C, D, E and F fields and 50 chains each between fields 1 and 2, and 2 and 3.

It will, however, be always useful to complete the whole system all over the Estate to begin with as opening work can then always be undertaken at the shortest notice and should at any time roads, watercourse, etc., have to be constructed through part of the jungle or works undertaken at any distance from the first clearing, the locality could be immediately located.

It is of course essential that from the beginning a record of everything is taken, beginning with the two mainlines; that not only all measures taken should be entered on plan, all corner pegs marked and complete squares made clearly distinguishable, further that a note and distance should be taken of every stream, hill, ridge, path

Plan of an Estate, approximately. 500 A.



LITHO: SURVEYOR GENERAL'S OFFICE SINGAPORE JUNE 07.

or whatever it may be, across which you come in cutting the rentices. By making such remarks on the plan along the rentice under work it will be easy after a time to connect these across the blank of the square even without having opened and actually seen the land.

Thus, without having had to go to any additional trouble and expense a very nearly accurate plan of the whole property will gradually develop itself, which can at any time be made into an accurate one as soon as the jungle goes down. There are very few of the old Estates in the country that can boast of such a plan and the making of one is likely to cost many times more than the laying down of such a co-ordinate system.

The advantages offered by the system for the ordinary Estate work are considerable. In a district where it is difficult to get reliable felling contractors the 10 acre blocks are a boon; I find it much easier to get 10-acre taken up and well done than 100 and before everything else: it is so much easier to control the men and progress and quality of their work. They do not mind paying a little attention to not throwing trees across the rentices and if this should happened by accident it is hardly a waste of money in the interest of supervision to spend a few dollars on clearing the rentices when work is done.

There is nothing more depressing than starting clearing work on a big field after a bad or indifferent burn. With my system I have, in such a case, gone in search of the best block and after defining the boundaries started work there when done with it. I did not only know that 10-acres were ready but I could start lining it immediately without having had to fear the chaos which would probably have been inevitable if starting lining in the old way.

For the lining of a field practically the worst part of the work has been done by the man laying out these 10-acre blocks. It is a matter of a few hours to put up along the two opposite sides of the square ready cleared for work, rows of panchangs, 13 ft. 2 in. apart; at every fifth peg a big pole is put in, marking distance of one chain; next these big poles on opposite sides have to be connected by straight lines of pegs, 13 ft. 2 in. apart. The result of this are ten fields each of 1 acre, in extent 10 chains long and 1 chain broad and I have not found a gang of coolies yet too silly to make a mess of the remaining detail work.

All clearing and burning done I have big holes dug a chain apart along the sides of every 10-acre fields and a coconut-tree planted there. The boundaries are thus permanently fixed and I know that the field before me is exactly 10 acres and contains exactly 50 × 50, *viz.*, 250 trees if planted 13 ft. 2 in. × 13 ft. 2 in. Some may prefer 13 ft. 2 in. × 26 ft. 4 in., but this is a detail.

I found that the whole working of an Estate cut up in this way is infinitely easier than with our old fields of irregular shape unknown area, and numbers of trees and rows and though I have none yet in

bearing I believe that it is not likely that the system will be found anything but useful when it comes to tapping or picking, whether on days wages or contract.

As will be seen from the sketch everyone of the blocks has its name; so for instance, there can be no mistake possible when I say that the stream running through fields E/2, D/2 and D/1 has its spring in the jungle at E/3 and it is impossible to miss a hill lying in G 5.

In the same way as every square can be accurately designated it is also possible to name every individual tree within one of the 10-acre blocks which, with the 50 trees in every direction represents a fixed spot in a similar though smaller co-ordinate system.

W. R. ROWLAND,
15th January, 1907.

TRANSMISSION OF RUBBER SEEDS.

We have received the following letter from Mr. BARTLETT of the Botanic Gardens, Demerara, as to a sending of seed of Para rubber from the Botanic Gardens:—"I am much obliged to you for the three boxes containing 1,200 seed I am glad to say that over 920 of the number have grown into plants and a few more are still appearing which I regard as very satisfactory, considering the length of time that they were on the voyage. Theydid not arrive here till nearly the end of October, *i.e.*, about two months after they were dispatched.

Transmission by parcels post would appear in spite of its costliness to be far the most economical way of sending Para rubber seeds for a distance, for out of another lot, of 12,000 obtained by a private grower here from Ceylon and sent in boxes of powdered charcoal not one plant has been raised."

H. N. R.

CHENGEI DAMAR.

We see by the *Malay Mail*, that Messrs. LANHAM and SHAW HILLIER intend to start a Damar Industry in the Raub district. The damar is to be obtained by tapping the "Chengal" tree *Balanocarpus maximus*.

This tree also known as Chengei and Penak, gives a beautiful transparent damar, of good quality for which there is some demand. This is perhaps the first European attempt to work the damar from the tree directly. One would like to know details of the methods adopted for obtaining it.

H. N. R.

POISONOUS BEANS.

The danger of the commonly cultivated Linia bean, *Phaseolus lunatus* has been pointed out in previous numbers of the Bulletin, the danger lying in the fact that in certain forms of the plant, the beans contain a glucoside accompanied with a ferment (enzyme) which on the addition of water produces hydrocyanic acid. Further experiments with these beans have been made and the results published in the Bulletin des Sciences Pharm, 13, 7 & 8, by M. L. GUIGNARD. It is shown that all forms of this bean contain the glucoside, and produce prussic acid, but the amount varies in different forms of the bean. In cultivated varieties it is scarcely perceptible, in wild or semiwild forms it is much larger and very dangerous to health. In Java beans it ranges from ·06 to ·32 per cent. Boiling the beans does not make them safe to eat, most of the compound is dissolved but not destroyed and if taken internally the digestive organs and blood containing ferments capable of acting on the glucoside can produce the prussic acid in the body not only the beans themselves but the water they have been boiled in may prove fatal if taken internally. Red and white Burmah beans only yield ·002 per cent. prussic acid. The Council of Hygiene in Paris has on the strength of these discoveries recommended the prohibition of the importation of Java beans and the admission of Burmese beans only on a certificate of origin and analysis.

RUBBER IN NEW GUINEA.

Dr. PAUL PREUSS whose work in the Agriculture of the German Colonies is well known, writes in a letter from Berlin :

"I have tapped Hevea, Ficus elastica and Castilloa elastica in our plantations in New Guinea and with very satisfying results. The Hevea rubber is valued and paid for like first class Straits rubber. The Ficus rubber is almost as good and fetches only six pence a pound less. Castilloa gets four shillings up to five shillings a pound.

Tapping on a large scale is to begin this year, and next year I shall go to New Guinea again. I am astonished on reading what good success you have had in sending these seeds packed in moist charcoal powder even to Jamaica."

This looks as if Rubber Cultivation had come to stay in New Guinea, in German territory at least.

H. N. R.

Fruiting of Crinum Northianum.

The handsome *Crinum.—C. Northianum* was described in the Bulletin of 1904, p. 310. In was sent from Kuching in Sarawak to the Botanic Gardens that year by the Right Reverend Bishop HOSE, and a number of plants were planted in an open damp bed

in the gardens, as well as some in pots. Some of them flowered that year, and this year one or two planted out fruited in November. The fruit has never been described, and as it is very different from that of *C. asiaticum* which otherwise this plant much resembles, I give a description of it. It is obliquely pear-shaped 4 inches long, narrowed at the base, and 3 inches through at the top which is terminated by the perianth tube 3 inches of which remain. The base is greenish on the inner side, the one facing the centre of the bunch of fruits, the upper part claret coloured polished. It contains three ovoid orbicular seeds each $2\frac{1}{2}$ inch long, $\frac{1}{2}$ inch through, the back rounded, the inner side hardly angled but flattened and depressed. They are the biggest seeds of any Crinum I know of.

The purple colouring of the pericarp resembles that of the pasture land *C. defixum* and is absent from that of *Crinum asiaticum* in which the pericarp is greenish white. The fruit and seed are very much larger than those of *C. asiaticum*, in fact they are the largest *Crinum* fruits I have seen.

H. N. R.

Lewis and Peat's Report on Plantation Grown Rubber from Ceylon, the Straits and Malay States for 1906.

6, Mincing Lane,

London, January, 1907.

There has been a great increase in the imports of Plantation Grown Rubbers to London during the past year. The total quantity being about 500 tons from Ceylon and Malaya, against about 200 tons during 1905, and also a few tons each from Java, Sumatra and Southern India, and some small lots from the West Indies. About 350 tons of this were sold at public auction. The range of prices has not been as high as those realized during 1905, and the difference between Fine Para from the Amazon and Plantation Grown has been reduced from about 1/ per lb. to 4*d* @ 6*d* per lb. Buyers are now much more particular about quality and appearance, and where, formerly, practically all grades fetched the same price, now dark and unsightly or mixed lots of biscuits and sheets do not realize within 3*d*. or 4*d*. per lb. of the better lots. It is very satisfactory to report that practically all prejudice against Crêpe has disappeared, and good pale has been in strong demand, also the lower grades have been selling extremely well. It is better for planters to send fair to good Crêpe than inferior biscuits or sheets, and scrap Rubber made into Crêpe is realizing a better price than the ordinary form of preparation. Block Rubber has taken a firm footing in the market and is readily saleable. Prices realized have been about 2*d* and 3*d*. per lb. above biscuits and sheets, but we do not look for a continuance of so great a premium.

Biscuits and Sheets.—These two forms may now be classed together and the quantity coming forward has not fallen off to any extent. Fine well prepared lots sell very well and fetch as much as fine Crêpe, but there have been many parcels dark unsightly and resinous. These have been very hard to sell and as much as 4*d*. to 6*d*. has been the difference between fine lots and inferior looking ones. We have had some beautiful though small lots of Ceara biscuits and in many instances they fetched the top price. The fine large amber sheets, hand or machine rolled, have always been easily saleable. No lots of smoked of any consequence have been offered.

Crêpe.—Lately fine pale No. 1 has been realizing 1*d*. and 2*d*. per lb. above the price for ordinary biscuits or sheets. Scrap Crêpe is selling very well and fetches a better price than the old hand-made scrap. Chip also has now found its level, manufacturers having found that it does not contain foreign matter, as from appearances one might be led to think.

Worms.—This form of preparation has sold well, and extremely good prices have been realized for all fine pale parcels.

Block.—Has sold readily but very little has come on to the market except from Lanadron Estate. There is no doubt that clear block rubber even in texture and quality will always meet a ready demand at very full prices.

Castilloa.—Not much has been seen on the market during the year, and the few lots sold have not been all that could be desired as regards preparation. Fine pale clear in biscuits, sheets or blocks would sell well. We have not seen this sort in Crêpe form.

Rambong.—This Rubber has also been in small supply, and the few small lots, especially good clean Crêpe, have sold well. This form is better than the old lumps, and with a fair supply would command a ready sale at a high price.

The closing quotations are :—

For Sheets and Biscuits	5/7 to 5/8	per lb.
Crêpe	5/7½ to 5/9	,,
Scrap	4/5 to 4/6	,,
Fine Para (Amazon)	5/3	,,
Worms	5/9 to 5/10	,,
Block	5/9 to 5/10	,,

GOW, WILSON & STANTON, LIMITED—
India Rubber Market Report.

13, Rood Lane, London, E. C.

January 18th, 1907.

At to-day's auction, 494 packages of Ceylon and Malaya Plantation grown rubber were under offer, of which about 481 were sold. The total weight amounted to over 31 tons, Ceylon contributing over 7 and Malaya over 24.

There was very strong bidding in to-day's auctions, and prices generally showed a decided advance, as much as threepence per lb. being frequently recorded.

There were several attractive parcels of crepe, sheet, etc. The highest price, 5/11, was realised for an exceptionally fine parcel of Rangbodde Ceara biscuits.

All kinds of crepe were again keenly competed for, and a fine lot from the Consolidated Malay Co. brought the highest price for this grade, viz., 5/10¾ per lb.

QUOTATIONS.—Fine sheet, 5/8½ to 5/9½.
Fine biscuits, 5/8¾ to 5/9½.
Very fine pale Ceara biscuits, 5/11.
Good biscuits, abt. 5/8.
Crepe { Fine pale, 5/10½ to 5/10¾.
Palish to darkish, 5/4 to 5/9½.
Dark, 4/11½ to 5/3¾.
Scrap { Fine, 4/6½ to 4/9.
Fair to medium, 4/4 to 4/6½.
Low, 1/9.

PLANTATION FINE TO-DAY.—5/9½ to 5/11, same period last year, 6/- to 6/1½.

PLANTATION SCRAP.—4/6½ to 4/9, same period last year, 3/5 to 5/3½.

FINE HARD PARA (South American).—5/3, same period last year, 5/3½.

AVERAGE PRICE OF CEYLON AND STRAITS SETTLEMENTS PLANTATION RUBBER.

481 packages at 5/6¼ per lb., against 292 packages at 5/3½ per lb. at last auction. Particulars and prices as follows:—

Ceylon.

MARK.	QUANTITY, DESCRIPTION AND PRICE PER LB.
Ellakande	3 cases fine pale biscuits, 5/8¾.
Nikakotua	3 cases good darkish pressed crepe, 5/2½.
Culloden	3 cases good palish biscuits, 5/8¾. 6 cases fine pale crepe, 5/10½. 6 cases good darkish crepe, 5/4½. 4 cases fine pale crepe, 5/10½. 4 cases darker, 5/3¼. 2 cases dark, 5/1¼.
Ingoya	5 cases fine palish to darkish biscuits, 5 8¾. 1 case good darkish scrap, 4/7¼.
Hattangalla	3 cases good biscuits, 5/8¾. 1 case palish pressed crepe, 5/4½. 1 case black 5/-.
Langsland	12 cases good biscuits, 5/8¾. 1 bag darkish sheet, 5/8¾.
Clontarf	2 cases good palish to darkish biscuits, 5/9¼. 1 case brown crepe, 5/3¼. 1 case darkish and dark crepe, 5/0¾.
Aberdeen	1 case fine palish biscuits, 5/9½. 2 cases similar, 5/9¼. 1 case darker, 5/8½. 1 case darkish pressed scrap, 4/6¼. 1 case thick rejections, 4/7¼.
Elston	2 cases good darkish biscuits, 5/9¼. 3 cases palish scrap, 4/7½. 1 case lump scrap, 4/7.
Tallagalla	2 cases good dark biscuits, 5/9. 1 case darkish pressed scrap, 4/7¼.

Warriapolla	1 case fine palish biscuits, 5/9¼. 1 case darker, 5/9. 1 case good scrap, 4/7½.
Taldua	2 cases dark biscuits, 5/9.
C Y	4 cases fine palish sheet, 5/9. 1 case darker, 5/9. 6 cases good scrap, 4/7. 1 case dark rejections, 5/7¼. 2 cases cuttings, 5/0¼.
Northumberland	1 case mixed dull biscuits, 5/9¼. 1 case good scrap, 4/7¾.
Clara	1 case thick biscuits, 5/9. 1 case good palish scrap, 4/7¾.
Ayr	1 case good palish biscuits, 5/9¼. 1 case good pressed scrap, 4/7¾.
Rangbodde	1 case very fine pale ceara biscuits, 5/11.
Doranakande	2 cases good dark biscuits, 5/9¼. 1 case rough dull biscuits and sheet, 5/8½. 3 cases fine darkish scrap, 4/8. 2 cases dark cuttings, 4/9.
Warriagalla	1 case fine blocked worm, 5/8¼. 1 case similar, 5/8¼. 1 case barky scrap, 4/6. 1 case good blocked worm, 5/6. 1 case darker, 4/-.
J J V & Co. A	3 cases good pressed scrap, 4/9.
" M T	1 case lace scrap, 4/11½. 1 case dark scrap and rejections, 4/4. 1 case similar, 4/4.
Ambatenne	2 cases low earthy scrap, 1/9.
Tallagalla	2 cases low earthy scrap, bought in.
C L	1 case palish to darkish crepe, 5/3¾. 15 cases darkish scrap crepe, 5/2½. 1 case black crepe, 4/11. 3 cases good darkish scrap, 4/7½. 2 cases dark pressed scrap, 4/6½. 1 case barky scrap, 4/4 1 case rejections, 4/5½. 1 case heated pressed sheet and crepe, 4/4.

STRAITS SETTLEMENTS.

MARK.	QUANTITY, DESCRIPTION AND PRICE PER LB.
V R CO. Ld. Klang FMS	15 cases fine amber washed sheet, 5/8½. 2 cases fine palish to darkish crepe, 5/5. 1 case darker, 5/2¼. 18 cases good dark block, 5/5¾ to 5/6½. 4 cases similar, 5/4¾ to 5/5¾. 3 cases good block, 5/1¼. 22 cases fine washed sheet, 5/8½. 2 cases fine pale pressed crepe, 5/6¾. 4 cases darkish, 5/3¼. 2 cases good brown crepe, 5/0¼.
S R Co.	15 cases good palish to darkish sheet, 5/8½. 2 cases palish to darkish crepe, 5/4¼. 11 cases darker, 5/1¾. 1 case dark crepe, 4/11½.
FH	2 cases good darkish sheet, 5/8½. 1 case similar, 5/8½. 1 case darkish pressed crepe, 5/2¾. 2 cases dark pressed crepe, 4/11. 1 bag fine scrap, 4/5½.
R B S	2 cases good sheet, 5/5½.
S S R	1 case fine scrap, 4/6¼.
VRCo.Ld. Klang FMS	11 cases good brownish crepe, 5/3¾.
Highland Est	17 cases good washed sheet, 5/8¾ to 5/9. 5 cases darker, 5/8¾. 8 cases good palish scrap crepe, 5/5¼. 3 cases good palish to darkish crepe, 5/4. 3 cases darker, 5/2½. 8 cases brown, 5/3¾.

Mark.	Quantity, Description and Price per lb.
B R R Co. Ld.	12 cases good palish to darkish scored sheet, 5/9$\frac{1}{4}$. 4 cases fine palish crepe, 5/6. 8 cases good darkish crepe, 5/3. 1 case darker, 5/1$\frac{3}{4}$. 2 cases good brown crepe, bought in. 1 case block ,bought in.
Linggi Plts. Ld.	22 cases very fine pale crepe, 5/10$\frac{1}{2}$. 4 cases palish to darkish crepe, 5/6.
Jebong	14 cases very fine pale crepe, 5/10$\frac{1}{2}$. 2 cases darker, 5/5$\frac{3}{4}$. 1 case good dark crepe, 5/2$\frac{3}{4}$. 5 cases similar, 5/3$\frac{3}{4}$. 1 case dark crepe, 5/1$\frac{3}{4}$.
S S B R Co. Ltd.	4 cases fine dark sheet, 5/9$\frac{1}{4}$. 4 cases good palish to darkish scrap, 4/7. 1 case thick rejections, 4/7.
Gapis	1 case good pale sheet, 5/9$\frac{1}{4}$. 2 bags scrap, 4/8.
MCI 1	3 cases good rambong ball, 4/7.
MCI 4	1 case thick rejections, 4/8$\frac{1}{2}$.
Bila	1 case fine pale sheet, 5/9$\frac{1}{2}$. 4 cases darker, 5/9$\frac{1}{4}$. 1 case good scrap, 4/7$\frac{3}{4}$.
MCf	1 case good rejections, 5/0$\frac{1}{2}$.
,, 6	1 case good pressed scrap, 4/8. 3 cases fine amber sheet, 5/9$\frac{1}{4}$
SP S	1 case good pale scrap, 4/8. 1 case rejections, 4/8.
SP	4 cases darkish washed sheet, 5/9$\frac{1}{4}$.
G K K B	1 case fine amber sheet, 5/9$\frac{1}{4}$.
T E B C	1 case darkish scrap crepe, 5/4$\frac{1}{2}$. 1 case similar, 5/4$\frac{1}{2}$.
Pataling	9 cases darkish crepe, 5/3$\frac{1}{4}$.
K M A	1 case pale sheet, 5/9 1 case similar, 5/9.
BNS KL	1 case palish to darkish sheet, 5/8$\frac{3}{4}$. 2 cases dull pale biscuits, 5/8$\frac{3}{4}$.
WGS	1 case low heated crepe, bought in.

Mark.	Quantity, Description and Price per lb.
Batu Tiga SRCO	1 case good dull biscuits, 5/9. 1 case similar, 5/9.
TES B	8 cases ball scrap, bought in. 1 case rejections, bought in.
BKS	1 case good scrap, bought in.
BKA S	2 cases palish to darkish sheet, $4/7\frac{1}{2}$.
BKC	1 case dark scrap, bought in.
CMRELtd.	9 cases fine pale crepe, $5/10\frac{3}{4}$. 8 cases fine palish to darkish crepe, $5/9\frac{1}{2}$. 7 cases somewhat similar, 5/8. 10 cases dark, $5/2\frac{3}{4}$.

GOW, WILSON & STANTON, LIMITED—
India Rubber Market Report.

13, Rood Lane, London, E. C.

February, 1*st* 1907.

At to-day's auction, 362 packages of Ceylon and Malaya Plantation grown rubber were under offer, of which about 226 were sold. The total weight amounted to over $20\frac{3}{4}$ tons, Ceylon contributing over $7\frac{1}{2}$ and Malaya nearly $13\frac{1}{4}$.

In sympathy with Para grades, the market was quieter and competition less animated, orders not being so plentiful as at last auction.

Most of the offerings changed hands at a slight decline on last sales's rates, all grades being affected.

There was another very fine small lot of pale clear Ceara biscuits which again realised the highest price of the auction, namely, $5/10\frac{1}{2}$ per lb. A small lot of good Rambong crepe also attracted attention and sold at $5/1\frac{3}{4}$ per lb.

Quotations.—Fine sheet, $5/8\frac{1}{4}$ to $5/8\frac{3}{4}$.
Fine biscuits, 5/8 to $5/9\frac{1}{4}$.
Very fine pale Ceara biscuits, $5/10\frac{1}{2}$.

Crepe:
- Fine pale, 5/9 to $5/9\frac{3}{4}$.
- Palish to darkish, $5/3\frac{1}{4}$ to $5/8\frac{1}{4}$.
- Dark, 4/10 to $5/2\frac{3}{4}$.
- Good dark Rambong crepe, $5/1\frac{3}{4}$.

Scrap:
- Fine, 4/6 to $4/7\frac{1}{2}$.
- Fair to medium, $4/0\frac{3}{4}$ to $4/3\frac{1}{4}$.
- Rambong, 4/7.

Plantation Fine To-day.—$5/8\frac{3}{4}$ to $5/10\frac{1}{2}$, same period last year, 5/8 to 6/2.

Do. Scrap.—$4/3\frac{1}{4}$ to $4/7\frac{1}{2}$, same period last year, 3/11 to $5/3\frac{1}{4}$.

Fine Hard Para (South American).—$5/2\frac{1}{4}$, same period last year, $5/4\frac{3}{4}$.

Average Price of Ceylon and Malaya Plantation Rubber.

226 packages at 5/5 per lb., against 481 packages at $5/6\frac{1}{4}$ per lb. at last auction.

Particulars and prices as follows :—

Ceylon.

Mark.	Quantity, Description and Price per lb.
Kipitiyagalla	26 cases fine darkish sheet, bought in. 2 cases good cuttings, bought in. 4 cases fine pressed scrap, bought in.
Suduganga	4 cases good biscuits, bought in.
C L	1 case fine palish to darkish crepe, 5/3¼. 13 cases darkish streaky crepe, bought in. 1 case brown, 5/2¾. 4 cases fine pale scrap, 4/7¼. 3 cases darker, 4/7. 2 cases darkish, 4/0¾. 1 case low scrap, bought in. 2 cases good darkish scrap, 4/6¾. 2 cases lace scrap, bought in.
TEA C	3 cases palish to darkish crepe, bought in.
TEB C	3 cases fine palish crepe, bought in. 2 cases dark pressed crepe, 4/10.
TES B	2 cases ball scrap, 4/3¼.
Gikiyanakande	8 cases very fine pale worm, bought in. 2 cases brown pressed crepe, bought in. 1 case dark pressed crepe, bought in.
BNS KL	2 cases rejected biscuits, 5/-. 3 cases good scrap, 4/6¾.
BNS S	1 case fine pale scrap, bought in.
KMS	3 cases pressed scrap, bought in. 1 case dark pressed scrap, bought in.
Arapolakande	7 cases fine darkish and dark biscuits, 5/8¼. 1 case fine pressed scrap, 4/6.
Glencorse	4 cases good palish to darkish biscuits, 5/8. 1 case very fine pale scrap, 4/7½. 1 case dark, 4/2. 1 case rejections, 4/8.
Culloden	3 cases fine amber biscuits, 5/8½. 5 cases fine pale crepe, 5/9¾. 7 cases good pale to darkish crepe, 5/2¾. 3 cases fine pale biscuits, 5/8¾. 3 cases fine pale and darkish biscuits, 5/9¼. 3 cases good darkish crepe, 5/3¼. 3 cases dark, 5/0¾. 1 case black pressed block, 5/2½.
Ellakande	1 case very fine amber biscuits, 5/8¾.
Heatherley	3 cases very fine pale amber biscuits, 5/8¾.
FJW	2 cases fine pale pressed worm, bought in.
Ambatenne	1 case good darkish biscuits, 5/8½. 1 bag good sheet, 5/8. 1 case good rough biscuits, 5/6.
VS KM	1 case good rough and pressed biscuits, 5/8. 1 bag barky scrap, 4/7.
Taldua	2 cases good biscuits, 5/8¼. 1 case good scrap, 4/7. 1 case darker, 4/6½.
Densworth	1 case good dark biscuits, 5/8¼.
Tallagalla	2 cases good dark biscuits, 5/8¼. 2 cases good pressed scrap, 4/7.
CL	8 cases palish and darkish crepe, bought in.
Sirigalla	1 case fine pale scrap, 4/7½.
Rangbodde	1 case very fine pale Ceara biscuits, 5/10½.

Malaya.

Mark.	Quantity, Description and Price per lb.
Highlands Estate.	29 cases fine washed sheet, bought in. 7 cases fine palish crepe, 5/5. 5 cases darker, 5/3¾. 9 cases brown, 5/2¾.
TEC C	2 cases dark pressed crepe, 4/10.

Mark.	Quantity, Description and Price per lb.
B K C	1 bag Castilloa, bought in.
VRCoLd. Klang FMS	20 cases fine washed sheet, 5/8¼. 2 cases very fine pale crepe, 5/9. 6 cases fine palish crepe, 5/6. 1 case darkish, 5/3½. 1 case brown, 5/2¾. 32 cases darkish smoked blocks, 5/4 to 5/5¾ (part sold).
P S E	7 cases good large sheet, 5/8½. 1 case darkish pressed crepe, 4/10½.
S R Co.	3 cases palish pressed crepe, bought in.
Sungei Krudda	7 cases good palish sheet (mouldy), 5/8¼. 2 cases fine scrap, 4/7¼. 3 cases mixed scrap, 4/5¼. 6 cases fine amber sheet, 5/8½.
B R R Co. Ltd.	3 cases palish crepe, bought in. 10 cases darkish, bought in.
Bila	3 cases very fine pale sheet, 5/8¾. 6 cases little darker, 5/8¾.
BB	2 cases good darkish biscuits, bought in.
C M R E Ltd.	9 cases fine pale crepe, 5/9 to 5/9¼. 10 cases fine palish crepe, 5/8¼ to 5/8½. 4 cases good dark crepe, 5/1.
Shelford	4 cases fine amber sheet, 5/8¼. 1 case good palish crepe, bought in. 1 case scrappy rejections, 4/7¼. 1 case Rambong crepe, 5/1¾. 1 case Rambong scrap, 4/7. 1 case dark crepe, 5/2½.

Lewis and Peat's Ceylon, Straits and Malay States Plantation Rubber Report.

18th January, 1907.

The following lots comprising about 8 tons Ceylon and about 20½ tons Straits and Malay States were offered at auctions to-day and sold as follows:—

Ceylon.

Mark.	Quantity, Description and Price per lb.			
Tallagalla	2 Cases	Darkish biscuits ...	@	5/9
	1 ,,	Fair darkish scrap ...	,,	4/7¼
Warriapolla	1 ,,	Fine pale biscuits ...	,,	5/9¼
	1 ,,	Good darkish biscuits ...	,,	5/9
	1 ,,	Fair brown scrap ...	,,	4/7½
Taldua	2 ,,	Very dark biscuits mixed palish ...	,,	5/9
CY	4 ,,	Pale and amber sheets ...	,,	5/9¼
	1 ,,	Darkish sheets ...	,,	5/9
	6 ,,	Darkish scrap ...	,,	4/7
Northumberland	1 ,,	Rather rough resinous biscuits ...	,,	5/9¼
	1 ,,	Brown scrap ...	,,	4/7¾
Clara	1 ,,	Improperly dried biscuits ...	,,	5/9
	1 ,,	Fair brown scrap ...	,,	4/7¾
Ayr	1 ,,	Good amber biscuits ...	,,	5/9¼
Rangbodde	1 ,,	Pale Ceara biscuits ...	,,	5/11
Doranakande	2 ,,	Very dark biscuits ...	,,	5/9¼
	1 ,,	Rough black biscuits ...	,,	5/8½
	3 ,,	Fair brown scrap ...	,,	4/8

Mark.	Quantity, Description and Price per lb				
Elston	2 Cases	Dark biscuits	...	@	5/9¼
	3 ,,	Pale scrap	...	,,	4/7½
Clontarf	2 ,,	Mixed biscuits	...	,,	5/9¼
	1 ,,	Scrap crepe	...	,,	5/3¼
	1 ,,	Chip crepe	...	,,	5/0¾
Aberdeen	3 ,,	Amber biscuits	...	,,	5/9¼ 5/9½
	1 ,,	Darkish amber biscuits	...	,,	5/8½
	1 ,,	Fair scrap	...	,,	4/0¼
Ellakande	3 ,,	Fine Pale biscuits	...	,,	5/8¾
Nirarotua	3 ,,	Dark crepe	...	,,	5/2½
Culloden	3 ,,	Pale biscuits	...	,,	5/8¾
	6 ,,	Pale crepe	...	,,	5/10½
	6 ,,	Scrap crepe	...	,,	5/4½
	4 ,,	Very fine pale crepe	...	,,	5/10½
	4 ,,	Scrap crepe	...	,,	5/3¼
	2 ,,	Black	...	,,	5/1¼
Ingoya	5 ,,	Pale amber biscuits	...	,,	5/8¼
Hattangalla	3 ,,	Biscuits mixed colours	...	,,	5/8¾
	1 ,,	Scrap crepe	...	,,	5/4½
Langsland	12 ,,	Biscuits mixed colours	...	,,	5/8¾
	1 Bag	Dark sheets	...	,,	5/8¾
C L	16 Cases	scrap	...	,,	5/2½ 5/3¾
	5 ,,	Brown scrap	...	,,	5/6½ 5/7½

Fine Para to-day price 5/2½ per lb.

Straits and Malay States.

Mark.	Quantity, Description and Price per lb				
Mc I	3 Cases	Good red Rambong Ball	...	@	4/7
	1 ,,	Pirgin biscuits	...	,,	4/8¼
	1 ,,	Scrappy sheets cuttings	...	,,	5/0½
	1 ,,	Fair Brown scrap	...	,,	4/8
	3 ,,	Good palish sheets	...	,,	5/9¼
Bila	1 ,,	Fine amber sheets	...	,,	5/9½
	4 ,,	Fine dark sheets	...	,,	5/9¼
	1 ,,	Fair brown scrap	...	,,	4/7¾
G KK B	2 ,,	Good amber sheets	...	,,	5/9¼
V R Co. Ld Klang F. M. S.	37 ,,	Rolled amber sheets	...	,,	5/8¼
	4 ,,	Palish crepe	...	,,	5/5 5/6¾
	16 ,,	Darkish crepe	...	,,	5/2¼ 5/3¾
	22 ,,	Black block	...	,,	5/5¾ 5/6½
	3 ,,	Undried	...	,,	5/1¼
	2 ,,	Brown scrap	...	,,	5/2¼

Mark.	Quantity, Description and Price per lb.				
S R Co.	15	Cases	Rolled amber sheets	... @	5/8½
	2	,,	Palish crepe	... ,,	5/4½
	11	,,	Dark scrap	... ,,	5/1¾
	1	,,	Black chip	... ,,	4/11½
F H	3	,,	Amber sheets	... ,,	5/8½
	1	,,	Dark crepe	... ,,	5/2¾
	2	,,	Black	... ,,	4/11
R B S	2	,,	Amber sheets, rather rough	... ,,	5/8½
S—"—R	1	,,	Fair brown scrap	... ,,	4/6½
C M R E Ltd.	9	,,	Fine pale crepe	... ,,	5/10¾
	8	,,	Palish part mottled	... ,,	5/9½
	7	,,	Palish part mottled and palish dark	,,	5/8
	10	,,	Chip and scrap	... ,,	5/2¾
B R R Co. Ld.	12	,,	Rolled amber sheets	... ,,	5/9¼
	4	,,	Mottled crepe	... ,,	5/6
	8	,,	Dark crepe	... ,,	5/3
	1	,,	Black	... ,,	5/1¾
Jebong	14	,,	Good pale crepe	... ,,	5/10½
	2	,,	Mottled crepe	... ,,	5/5¾
	6	,,	Scrap crepe	... ,,	5/2¾ 5/3¾
	1	,,	Chip crepe	... ,,	5/1¾
SSBRCoLd	4	,,	Dark amber sheets	... ,,	5/9¼
	4	,,	Fair brown scrap	... ,,	4/7
GAPIS	1	,,	Pale sheets	... ,,	5/9¼
Highlands	17	,,	Rolled sheets	... ,,	5/8¾ 5/9
Estates	5	,,	Darkish sheets	... ,,	5/8¾
	11	,,	Mottled crepe	... ,,	5/4 5/5¼
	11	,,	Darkish crepe	... ,,	5/2½ 5/3¾
Linggi	22	,,	Very fine pale crepe	... ,,	5/10½
Plantations	4	,,	Mottled crepe	... ,,	5/6
T E B	2	,,	Mottled crepe	... ,,	5/4½
K M A	2	,,	Pale sheet	... ,,	5/9
B N S	3	,,	Biscuits and rather rough	... ,,	5/8¾
Batu Tiga	2	,,	Good palish biscuits	... ,,	5/9
B K A	3	,,	Darkish sheets	... ,,	5/9

Lewis and Peat's Ceylon, Straits and Malay States Plantation Rubber Report.

1st February, 1907.

The following lots comprising about 7 tons Ceylon and about 15 tons Straits and Malay States were offered at auctions to-day and sold as follows:—

Ceylon.

Mark.	Quantity, Description and Price per lb.			
Ambatenne	1 Case	Good palish biscuits	@	5/8½
	1 Bag	Darkish and pale sheets	,,	5/8
	1 Case	rough dark biscuits	,,	5/6
V S / K M	1 ,,	Dark and rough biscuits and sheets	,,	5/8
	1 Bag	Ordinary palish scrap	,,	4/7
Taldua	2 Cases	Fair dark Para biscuits	,,	5/8¼
	1 ,,	Fair brown scrap	,,	4/7
	1 ,,	Dark brown scrap	,,	4/6½
Densworth	1 ,,	Small dark amber biscuits	,,	5/8¼
Tallagulla	2 ,,	Darkish biscuits	,,	5/8¼
	2 ,,	Fair brown scrap	,,	4/7
C L	8 ,,	Mottled scrap crape	,,	bid 5/1¼
Rangbodde	1 ,,	Very fine pale Ceara biscuits	,,	5/10½
Kepitagalla	26 ,,	Dark sheets	,,	bought in.
	2 ,,	Pieces	,,	bought in.
	4 ,,	Fair scrap	,,	bought in.
Suduganga	4 ,,	Mixed biscuits	,,	bought in.
	1 ,,	Palish crepe part mottled	,,	5/3¼
C L	13 ,,	Scrap crepe	,,	bought in.
	1 ,,	Brown crepe	,,	5/2¾
	4 ,,	Good pale scrap	,,	4/7¼
	5 ,,	Darkish scrap	,,	4/6¾-4/7
	2 ,,	Black scrap	,,	4/0¾
	2 ,,	Lace	,,	bought in.
T E A	3 ,,	Darkish crepe part mottled	,,	bought in.
T E B	3 ,,	Darkish crepe part mottled	,,	bought in.
	2 ,,	Black chip crepe	,,	4/10
Arapolakande	7 ,,	Dark biscuits	,,	5/8¼
	1 ,,	Pressed scrap	,,	4/6
Glencorse	4 ,,	Mixed biscuits	,,	5/8
	1 ,,	Good pale scrap	,,	4/7½
	1 ,,	Dark pale scrap	,,	4/2
F J W	2 ,,	Pale worms	,,	bought in.
Cullodean	6 ,,	Fine Biscuits	,,	5/8½ 5/8¾
	8 ,,	Fine pale crepe	,,	5/9¼ 5/9¾
	7 ,,	Fair mixed darkish crepe	,,	5/2¾

Mark.	Quantity, Description and Price per lb.				
	3	Cases Darkish crepe	...	@	5/3¼
	3	,, Black crepe	...	,,	5/0¾
	1	,, Black block	...	,,	5/2½
Ellakande	1	,, Fine pale biscuits	...	,,	5/8¾
Heatherly	3	,, Fine pale biscuits	...	,,	5/8¾
		Straits and Malay States.			
Bila	3	,, Fine large palish sheets	...	,,	5/8¾
	6	,, Fine large sheets and A. darker	...	,,	5/8¾
B B	2	,, Mixed biscuits	...	,,	bought in.
Highland	29	,, Rolled sheets rather mouldy	...	,,	bought in.
Estates	7	,, No. 1 crepe, part darkish	...	,,	5/5
	5	,, Scrap crepe	...	,,	5/3¼
	9	,, Brown crepe	...	,,	5/2¾
T E C	2	,, Black chip crepe	...	,,	4/10
B N S	2	,, Small scrappy biscuits	...	,,	bought in.
K L	3	,, Brown scrap	...	,,	bought in.
	1	,, Pale scrap	...	,,	bought in.
K M S	3	,, Pressed virgin scrap	...	,,	bought in.
V R Co Klang F M S	20	,, Rolled sheets	...	,,	5/8¼
	2	,, Fine pale crepe	...	,,	5/9
	6	,, Good pale crepe	...	,,	5/6
	1	,, Darkish crepe	...	,,	5/3½
	1	,, Good chip	...	,,	5/2¾
	32	,, Dark block	14 sold		5/5½ @ 5/5¾
P S E	7	,, Large dull sheets	...	,,	5/8¼
S R Co.	3	,, Fair darkish crepe	...	,,	bought in.
Sungei Krudda	7	,, Amber sheets mouldy	...	,,	5/8¼
	2	,, Brown scrap	...	,,	4/7¼
P S E	1	,, Inferior scrap crepe	...	,,	4/10½
Sungei Krudda	3	,, Loose pieces scrap	...	,,	4/5
	6	,, Fair sheets	...	,,	5/8½
C M R E Ld.	9	,, Fine pale crepe	...	,,	5/9¼ @ 5/9
	10	,, Good crepe	...	,,	5/8¼ @ 5/8½
	4	,, Black crepe	...	,,	5/1
Shelford	4	,, Very mixed sheets	...	,,	5/8¼
	1	,, Dark scrap crepe	...	,,	bought in.
	1	,, Pieces	...	,,	4/7¼
	1	,, Red Rambong crepe	...	,,	5/1¾
		To-days price of Fine Para	...	,,	5/2 lb.

Penang.

Abstract of Meteorological Readings in the Criminal Prison Observatory for the month of January, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Mean Maximum.	Mean Minimum.	Mean Range.	Mean Wet Bulb.	Mean Vapour Tension.	Mean Dew Point.	Mean Humidity.			
	Ins.	°F	°F	°F	°F	°F	°F	°F	°F	%		Ins.	Ins.
Criminal Prison Observatory	29·915	149·4	79·9	88·3	72·9	15·4	74·5	·765	70·78	73	North	1·54	1·22

Colonial Surgeon's Office,
Penang, 11*th February*, 1907.

M. E. SCRIVEN,
Assistant Surgeon.

T. C. MUGLISTON,
Colonial Surgeon, Penang.

Perak.

Abstract of Meteorological Readings in the various Districts of the State for the month of January, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Taiping ..	...	149	80·66	92	69	23	76·33	851	...	81	...	8·32	1·41
Kuala Kangsar ...	...	...	79·84	92	67	25	75·81	840	...	82	...	6·81	3·00
Batu Gajah ...	...	157	80·11	92	69	23	75·68	831	...	80	...	6·69	2·12
Gopeng ...	...	...	80·87	91	62	29	75·56	817	...	77	...	14·62	3·02
Ipoh ...	..	...	79·30	92	70	22	76·12	830	...	86	...	6·90	1·38
Kampar ...	...	...	79·77	92	73	19	75·67	835	...	82	..	9·82	1·72
Teluk Anson ...	...	...	80·88	90	62	28	76·61	859	...	81	...	11·90	4·60
Tapah ...	...	...	80·94	92	69	23	76·19	841	...	79	...	9·89	1·90
Parit Buntar ...	...	...	81·16	91	68	23	76·06	830	...	78	...	2·92	0·70
Bagan Serai ...	...	...	81·08	91	69	22	77·03	875	...	83	...	3·15	1·06
Selama ...	...	...	81·08	93	68	25	76·06	831	...	78	...	7·05	2·70

STATE SURGEON'S OFFICE,
TAIPING, 12*th February*, 1907.

S. C. G. FOX,
Acting State Surgeon, Perak

Selangor.

Abstract of Meteorological Readings in the various Districts of the State for the month of January, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature. Mean Dry Bulb.	Temperature. Maximum.	Temperature. Minimum.	Temperature. Range.	Hygrometer. Mean Wet Bulb.	Hygrometer. Vapour Tension.	Hygrometer. Dew Point.	Hygrometer. Humidity.	Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
General Hospital, Kuala Lumpur	29·872	148·7	80·6	89·3	71·1	18·2	76·4	·833	73·7	80	Calm	3·05	1·24
Pudoh Gaol Hospital ,, ...	...	...	...	...	...	...	...	...	...	...	...	3·29	1·53
District Hospital ,, ...	...	...	...	...	...	...	...	...	...	...	...	3·46	1·40
,, Klang	...	...	...	86·8	70·6	16·2	...	...	...	...	...	4·08	1·20
,, Kuala Langat	...	...	...	...	...	...	...	...	...	...	...	6·58	2·85
,, Kajang	...	...	...	89·5	70·1	19·4	...	...	...	...	...	4·79	1·26
,, Kuala Selangor	...	...	...	...	...	...	...	...	...	...	...	6·06	2·80
,, Kuala Kubu	...	...	...	...	...	...	...	...	...	...	...	8·68	2·98
,, Serendah	...	...	...	91·1	68·0	23·1	...	...	...	...	...	4·13	1·57
,, Rawang	...	...	...	...	...	...	...	...	...	...	...	4·14	1·10
Beri-beri Hospital, Jeram	...	...	...	...	...	...	...	...	...	...	...	8·04	2·10
Sabah, Bernam	...	...	...	...	...	...	...	...	...	...	...	4·72	1·50

State Surgeon's Office,
Kuala Lumpur, 16*th February*, 1907.

E. A. O. TRAVERS,
State Surgeon, Selangor.

Pahang.

Abstract of Meteorological Readings in the various Districts of the State for the month of January, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Temperature.					Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
		Maximum in Sun.	Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Kuala Lipis ...	...	...	...	91·0	65·0	17·29	...	...	...	...	...	4·71	1·12
Raub ...	...	...	...	90·0	60·0	12·17	...	...	...	...	...	6·48	1·65
Bentong ...	...	...	...	91·0	64·0	14·56	...	...	...	...	...	2·78	·84
Temerloh ...	...	...	...	90·0	68·0	12·83	...	...	...	...	...	·75	·24
Pekan ...	...	...	...	88·0	70·0	10·08	...	...	...	...	...	2·13	·71
Kuantan ...	...	...	...	86·0	68·0	14·06	...	...	...	...	...	1·23	·52

W. H. FRY,

State Surgeon, Pahang.

RAUB,

20th February, 1907.

The Duff Development Company, Limited, Kelantan.

Abstract of Meteorological Readings for the month of January, 1907.

District.	Temperature.			Rainfall.	
	Maximum.	Minimum.	Range.	Total Rainfall.	Greatest Rainfall during 24 hours.
	Mean. °F	Mean. °F	Mean. °F	Inches.	Inches.
Kuala Lebir ...	83·9	68·4	15·5	8·32	7·86
Serasa ...	91·8	70·5	21·3	8·32	4·28
Kuala Kelantan ...	77·0	71·0	6·0	6·42	4·65

SURGEON'S OFFICE,

12th January, 1907.

WISTON BAKER,

Surgeon.

AGRICULTURAL BULLETIN

OF THE

STRAITS

AND

FEDERATED MALAY STATES.

No. 6.] JUNE, 1907. [Vol. VI.

ABNORMALITIES IN THE STEM OF HEVEA.

Burrs.

The occurrence of burrs on the trunk of the Para-rubber especially in trees that have been cut or tapped has frequently been noticed by planters, and several letters have been received from time to time by the Editor containing enquiries on the subject. A portion of one letter from Mr. BURGESS I append, with some sketches by him. The burrs are more or less rounded woody knots or tumours projecting from the bark. In small samples they are very easily knocked out of the trunk and are seen to be more or less globular or pear-shaped nodules of wood ending in a short point, directed towards the trunk of the tree. They are covered outside with thick bark. And when knocked out of the tree leave a corresponding depression. In other cases they are larger and more irregular in outline, and cannot be detached. The largest I have seen is on the erect branch of a prostrate rubber tree in the Botanic Gardens in Singapore. It is irregularly hemispherical or rather half oval, and measures 18 inches across, transversely, a foot long vertically and about 8 inches in thickness. The origin and cause of these burrs is this. The Para-rubber tree like many others, produces during its growth a number of buds, which never developing into branches unless from some accident become in time covered with a later growth of wood, and are known as dormant buds. If a tree possessing dormant buds is cut down to near the base, these dormant buds may develop and appear as shoots. As every one knows in felling jungle if the stumps of the trees are not dug out, many will throw out shoots which may develop into full-sized stems. These are derived from the dormant buds. Frequently, too, use is made of dormant buds for propagation of plants which are otherwise difficult to reproduce. Thus in some of the *Araliaceæ,* such as *Trevesia eminens,* the stem frequently remains simple without branching. In order to make it throw out additional side branches either to

serve as cuttings or to improve the appearance of the tree, it is only necessary to make incisions through the bark of the stem here and there, should one of these cuts pass through the point where there is a dormant bud this bud will commence growth and develop into a branch.

If the dormant buds are too thickly covered with wood so that they cannot push through to the surface and form shoots, their growth is arrested and a woody tumour is the result. In examining a large series of trees which have been tapped in various ways one observes that in ordinary herring-bone tapping the occurrence of burrs after repair of the wound is not very common. They usually occur at the top corner of a cut, and are small. In the old Brazilian system of single taps with a small chopper, they are very abundant, and in some cases have thrown out shoots. In the case of the very large burr referred to above the tree had not been tapped at that point the injury was probably caused accidentally by a bough or some such thing striking it. Casual careless wounds caused by coolies or others hitting a tree with a parang may cause a burr to form.

In the case of the small single bud burrs, the woody nodule is gradually pushed out of the trunk and can be removed by a sharp rap from a stick when the wound will soon heal. Larger ones if objectionable can be cut off with a chisel and the wound allowed to heal, but unless necessary this is not recommended in the case of a big burr as the wound might not readily heal.

The burrs and tumours in no way injure the vitality of the tree or interfere with its health, but are certainly inconvenient for tapping. Most old trees, however, have very irregular bark, and often irregular wood development, so that one does not get the smooth easily cut bark of the young tree, and tapping tools suitable for the latter are not suited for the former. Indeed the greater thickness and hardness of the bark of a twenty-year-old tree alone would cause a modification of the tools necessary.

Malacca Rubber Plantations, Limited

BUKIT ASAHAN,

MALACCA, 10*th March*, 1907.

Dear RIDLEY,—A number of our trees are developing warts and lumps, it appears that wood forms between the cambium and the cork layers and spreads underneath the cork as islands of wood

surrounded by cambium. This objectionable growth is most common on severely tapped trees but is not confined to the tapped area and is sometimes met with an untapped tree. Do you know the

Section of stem—+

Cambium—+

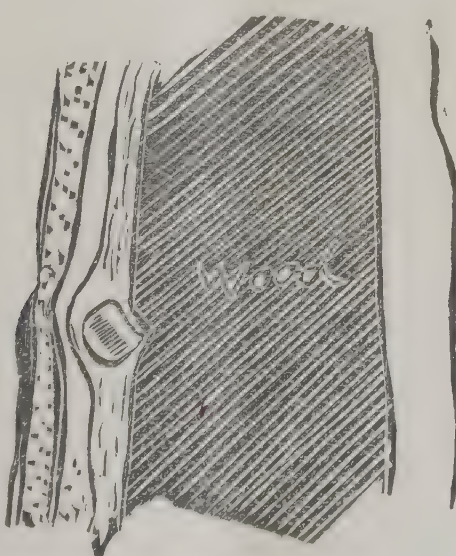
Cork in bark—+

cause, and what will be the ultimate fate of these growths, will they cut themselves out by growth of cambium, or will they continue to spread indefinitely? Some I have tried to cut out and find them seven or eight inches long and wide in proportion.

They appear to commence as small globules of wood inside the bark, with a spur point piercing the true cambium and in contact with the wood of the tree—thus.

Cork—+

Cambium—+



Are they dangerous to the welfare of the tree and if so, should they be excised wherever seen beginning. Tapping has been done with the help of the pricker, do you think that the pricker, by chipping off and leaving small fragments of wood surrounded by cambium, could start these unpleasant growths.

I should be very glad if you can tell me anything about this, and whether other places have had trouble with the same thing. There

is milk both on the external and internal surfaces of the woody growth, presumably because each is separately growing, and surrounded by the cambium and latex forming tissue.

Yours truly,
P. J. BURGESS.

WIND TWIST.

In positions where trees are subject to strong winds from one direction the trees take on an odd form which is known as wind twist. There are some very good examples in the Botanic Gardens. The trunk of the tree chiefly in old trees shews a series of spiral ribs usually rising from right to left. Some times the trunk is distinctly flattened in the direction facing the wind. Where the wind has had the greatest force the trees are very curious. There is a close series of transverse ridges with depressions between on the side facing the prevailing wind, from the bottom of the trunk to the top of the higher thick branches. This gives a most curious ladder-like appearance to the trunk.

Trees like this are decidedly troublesome to tap as the cuts have to run up and down over the waves of bark and wood and it is difficult to get the latex to run just where it is wanted to flow.

H. N. RIDLEY.

MALAY DRUGS.

KELANTAN,
September 16*th*, 1906.

Dear Mr. RIDLEY,—Some time before his leaving Kelantan, Dr. GIMLETTE told me that you were thinking of revising your paper on "Malay Materia Medica," and that he was trying to collect information which might be of use to you. As I had previously helped Dr. GIMLETTE in collecting notes on other subjects, I tried to do the same in this case; but unfortunately I had to move from Kota Bharu into the interior just about that time, and was only able to leave a list of diseases and their cures (abstracted from your paper) with a Malay friend and instruct him to question any available Toh Bomo concerning them. I have now had a letter from him saying that he has questioned four or five Toh Bomo without success, as they did not recognise the name of the plants (nor, probably, the names of the diseases as translated by me), and enclosing two short lists of notes. I send you these lists, but I feel sure that they are really too slight to be of any use for your purpose.

Should there be any subject on which you wish for information from Kelantan at any time, I hope you will let me know, as I always enjoy having some work of this kind on hand.

Trusting that you will excuse my troubling you with this letter.

I have, etc.,

H. W. THOMSON.

NOTES RE MALAY MATERIA MEDICA.

GIVEN BY HAJI AHMAD, KAMPONG LIPANG, KELANTAN.

1. Minyak Jarak (Castor-oil).—Used for inflammation of muscles.
2. Minyak Kayu Gharu.—Used for shooting pains in the stomach.
3. Glang Pasir (*Eugenia sp*).—Roots used for general debility.
4. Bermin (*Herpestes monnieria*).—Leaves used for thread-worms.
5. Akar Tempu or Tempu Ranak (*Rubus moluccanus*).—Roots used in case of a mild stroke of paralysis.
6. Akar Jolong Hitam.—Roots used for malarial fever.
7. Poko' Ekor Kuching and Poko' Ekor Pari.—Roots used for pain about the kidneys.
8. Akar Kemian Hantu.—Roots used for syphilis (? or for leprosy).
9. Rumput Sabueh.—Used for relieving excess of phlegm, boiled with Kemian Arab, and the liquid drunk.
10. Akar Sumpu Darah.—Roots used for colic attended with constipation.
11. Akar Priok Kra (*Nepenthes*).—Used for remittent fever rubbed on a grindstone and the liquid drunk while at the same time "Klat Benar" pisangs are eaten.
12. Ribu-ribu.—Used for fever with perspiration at nights—take the leaves together with Lalang leaves and spread them over the mattress.
13. Chendawan Merah.—Used for skin disease which causes the skin to peel off—heat it over a fire together with the feathers of Cotton Teal, add some oil of padi husk (? the volatilised essence), and spread it over the patches of diseased skin.
14. Pegaga (*Hydrocotyle asiatica*).—Leaves used for Asthma—take the leaves with some leaves of both kinds of Ruku-ruku (*Ocimum*) (R. padang and R. hutan), three strips of Bawang Puteh and three strips of Halia Merah, chew them and spit them out on to the four "cardinal points" of the patient's body (chest, back and sides).

15. Tombok Bukit.—Roots used for shooting pains in the stomach.
16. Mata Pelandok (*Ardisia crenulata*).—Leaves used for ear-ache.
17. Lidah Jin (*Hedyotis conferta*).—Eaten with the juice of Ketula Pahit after confinement. The leaves of Lidah Jin are divided into three, and one-half of the leaf is red.*
18. Tampa Besi and Kesinan and Sena (*Ficus quercifolia*).—Used for syphilis—rub the roots on a grindstone with water.
19. Kuncha.—Leaves used for biliousness and slight stomach trouble.
20. Dukong Anak (*Phyllanthus urinaria*, a diuretic).—Roots used after confinement.
21. Champa and leaves of Sisek Puiyu-puiyu.—For worms in children's eyes—crush the leaves under a grindstone and put them on the eyes.
22. Sapucha Pelandok, an aphrodisiac.—Take the roots and eat them together with Aleh Betinggong and Ubi Besi—eat with Sireh.

GIVEN BY HAJI BIDAH, MIDWIFE, KAMPONG SIREH.

Medicine for use at the time of confinement:—

7 leaves of Trong Prat
7 bulbs of Bawang Puteh (Onion)
7 corns of Lada Hitam (Black Pepper)
7 slices of Halia Bara (Ginger)
7 slices of Kunyit (Turmeric)

All these are pounded together and the juice taken: drink on the day of confinement. (The words "sampai hari" are not very clear. If they are correct, the actual day of birth is probably meant. Possibly "tiga" or some other numeral has been omitted).

Medicine to be taken three days after birth:—

Leaves of Ara Tanah
Shoots of Areca-nut which have not yet opened out
Leaves of Menalu Api

All these are pounded together, and the juice taken: to be taken on the first three mornings after confinement on an empty stomach.

Another Prescription:—

Leaves of Tarum (Indigo)
Leaves of Limau Kerbau (Lime)
Leaves of Kesum

* This description sounds more like that of the leaves of (*Euphorbia heterophylla.*)

All these are pounded together and the juice taken: also to be taken on the first three mornings on an empty stomach.

External Application :—

Kunyit—Contents of roots (Turmeric)
Temu Kunchi—Contents of central root
Temu Lawak—Contents of roots
Kunyit Tebu— Do. do.
Balai— Do. do.

All these are pounded together and the juice taken: this is then cooked and made warm: it is smeared on the woman's body for twenty days.

Prescription for use with the Abdominal Bandage :—

Juice of Asam Limau Nipis (Small lime)
Jadam Arab
Seeds of Jintan Puteh
Grains of Pulut Hitam (Black rice)
Contents of root of Halia Bara (Ginger)
Seeds of Adas Manis
Seeds of Adas Pedas

All these are pounded together, then mixed with water and heated at a fire: then they are smeared on the abdomen which is tied up and bandaged for three days after birth.

Perkataan Bidan Haji Bidah, Kampong Sireh.

Ubat dipakai di-dalam masa beranak :—

Daun Trong Prat—7 helai
Bawang Puteh—7 ulas
Lada Hitam—7 butir
Halia Bara—7 hiris
Kunyit—7 hiris

Maka sikilian itu ditumbok, ambil ayer: habis diminum sampai hari.

Ubat makan lepas tiga hari beranak :—

Daun Ara Tanah
Puchok Pinang yang tiada kembang lagi
Daun Menalu Api

Maka sikilian itu ditumbok, ambil ayer: habis diminum sampai tiga pagi sabelum makan apa-apa.

Ubat makan juga :—

Daun Tarum
Daun Limau Kerbau
Daun Kesum

Sikilian ini ditumbok, ambil ayer: habis diminum tiga pagi juga sabelum makan.

Ubat Luar:—

Kunyit—pakai isi
Ibu Temu Kunchi—pakai isi.
Temu Lawak—pakai isi.
Kunyit Tebu—pakai isi.
Balai—pakai isi.

Sikilian itu ditumbok, ambil ayer; kemdian dimasak, bri panas: habis chomor di badannya sampai dua puloh hari.

Ubat Barut prut:—

Asam Limau Nipis—pakai ayer
Jadam Arab
Jintan Puteh—pakai biji
Pulut Hitam—pakai biji
Halia Bara—pakai isi
Adas Manis—pakai biji
Adas Pedas—pakai biji

Sikilian itu ditumbok, kemdian dimasok dengan ayer juga; kemdian dihangatkan di api: habis dichomor di prut serta barut dendan kemas sampei tiga hari kemdian deripada beranak.

Perkataan Tuan Haji Ahmad, Kampong Lipang.

1. Minyak Jarak.—Dipakai juga fasal penyakit bengkak urat.
2. Minyak Kayu Gharu.—Dipakai juga fasal meradak.
3. Klang Pasir.—Dipakai juga fasal lengah didalam badan—pakai akar.
4. Bermin.—Dipakai fasal penyakit kerawit—daun.
5. Akar Tempu atau Tempu Ranak.—Pakai fasal kena penyakit kapanasan—akarnya.
6. Akar Jolong Hitam.—Pakai fasal demam pialu—akarnya.
7. Poko' Ekor Kuching dan Poko' Ekor Pari.—Pakai fasal penyakit didalam pinggang—akarnya.
8. Akar Kemian Hantu.—Pakai fasal penyakit seduan—akarnya.
9. Rumput Sabueh.—Pakai fasal belaram—dimasak dengan Kemian Arab, minum ayernya.
10. Akar Sumpu Darah.—Pakai fasal penyakit rengat—akar.
11. Akar Priok Kra.—Pakai fasal demam kura—asah, minum ayer serta makan buah Pisang Klat Benar.
12. Ribu-ribu.—Dipakai fasal demam kluar pluh malam—ambil daunnya dan daun Lalang dilampit bawah tidor.
13. Chendawan Merah.—Pakai fasal sopak—digoring dengan bulu burong Itek Ayer, kemdian dimasok Minyak Sekam, serta dichomor pada sopak itu.
14. Pegaga.—Daun dipakai fasal penyakit lelah; sembor ampat pedahat dengan daun Ruku-ruku kadua (R. padang dan

R. hutan) dan Bawang Puteh tiga hiris dan Halia Merah tiga hiris.

15. Tombok Bukit.—Pakai juga fasal meradak—akarnya.

16. Mata Pelandok.—Pakai fasal sakit telinga—daunnya.

17. Lidah Jin.—Dimakan dengan ayer Ketula Pahit fasal membaik tuboh perampuan. Daun Lidah Jin itu berchabang tiga, daunnya merah sakrat.

18. Tampa Besi dan Kĕsinan dan Sena.—Fasal penyakit seduan sundal; akarnya asah dengan ayer.

19. Kuncha.—Pakai fasal penyakit medu—daunnya.

20. Dukong Anak.—Fasal membaikki tuboh perampuan; pakai akarnya.

21. Champa dan daun Sisek Puiyu-puiyu.—Pakai fasal kanak-kanak kena chaching naik ka-mata—ambil daunnya giling, habis dipuput.

22. Sapucha Pelandok.—Fasal kuat zekar—pakai akarnya dimakan dengan Aleh Betinggong dan Ubi Besi. Makan dengan Sireh Pinang.

DISEASES OF COCOA-NUT PALMS

The attention of cultivators of cocoa-nuts in the West India Islands has been called of late to the occurrence of a serious disease known as the 'bud-rot.' Mention has already been made of it in the *Agricultural News* (Vol. IV, pp. 299 and 369), and all the information relating to the disease was collected and reprinted in the *West Indian Bulletin* (Vol. VI, pp. 307-21) in the hope of assisting cocoa-nut planters. Owing, however, to the anxiety that was felt in regard to the cocoa-nut industry of Trinidad, where large numbers of palms were reported as having died, Mr. F. A. STOCKDALE, B.A., the Mycologist on the staff of the Imperial Department of Agriculture, after examining many specimens, paid a visit to that colony in July and August, 1906, to inquire into the causes of the diseases of the cocoa-nut palms, which were reported to be prevalent there.

The Trinidad *Royal Gazette*, of February 14, 1907, publishes for general information a report by Mr. STOCKDALE on this visit, in which are described three different diseases attacking cocoa-nut palms in Trinidad. The three diseases have been called the 'Root disease,' the 'Leaf disease,' and the 'Bud-rot.' The following extracts have been taken from the report:—

The root disease is, without doubt, the most serious; it is widely distributed, and is causing considerable loss in some districts.

ROOT DISEASE.

This is apparently caused by a fungus, a species of *Botryodiplodia*, and may be recognized by the yellowing and hanging down of the leaves, by the disorganized condition of the cortex of the roots, by

the red ring of discoloration that may be seen in the stem, and by the pustules bearing fungus spores that are invariably seen, sooner or later, on the dead leaf-stalks (petioles).

The disease may spread through the soil by means of mycelium, by spores blown by the wind from tree to tree, and by means of the fall of diseased petioles, while replanting of supplies on diseased spots without proper cultivation and treatment may be a means of continuing the disease in the next corp of trees. The disease appears in all soils, but apparently spreads more rapidly and is more destructive in damp, low lying, undrained hollows. Undrained, uncultivated, neglected portions of any estate are a standing menace to the whole estate and perhaps to the whole district.

To prevent further spread of the disease, the following remedial measures have been suggested :—

(*a*) All dead or dying trees, diseased leaves and petioles that have fallen to the ground, rubbish, etc., should be destroyed either by fire or by burying deeply with lime. All stumps should be grubbed up and as many diseased roots as possible destroyed.

(*b*) When it is noticed that small areas are attacked, they may be isolated from the remainder of the estate by digging a good trench around them. This should prevent spread of mycelium in the soil to other portions of the estate.

(*c*) Resting and cultivation of infected land that has been cleared and burnt before replanting 'supplies.'

(*d*) Spraying and application of chemicals to destroy spores, and also mycelium in the soil.

(*e*) Replanting should be done with ripe nuts from disease-resistant trees, if such can be found.

Leaf Disease.

The leaf disease is limited to small areas, which are apparently in want of better cultivation.

It is caused by a fungus—a species of *Pestalozzia*—and may be recognized by the yellowish spots on the leaflets, especially near their tips. These spots gradually increase in size, the distal leaflets of the leaf turn yellow, then brown, and eventually die. When the leaflets of the terminal 2 or 3 feet of the leaf have died, this portion breaks off and hangs vertically downwards from the end of the dying leaf. (This is characteristic of the disease, and is probably due to the weight of the dead tip causing it to break off.) Eventually the whole leaf dies, and others become infected.

This fungus (*Pestalozzia* sp.) reproduces itself by means of spores on the upper surfaces of the leaflets, and is frequently accompanied by another fungus, *Diplodia epicocos*, the fructifications of which may be observed as small, black spots, generally along the veins of the leaflets near the mid-rib or on the petioles. Experiments so far

indicate that the latter fungus is either saprophytic or only completes destruction commenced by *Pestalozzia*. The spread of this disease is accomplished by wind and rain, and therefore, besides making every effort to keep the cocoa-nut trees healthy and vigorous by improved cultural methods, all sources of infection should be removed, as they may be the cause of considerable damage during an unfavourable season.

The following remedial measures are recommended :—

(*a*) All dead trees should be cut down and, with diseased leaves, etc., should be destroyed, preferably by fire.

(*b*) Isolated trees that show signs of disease should be marked, carefully watched, and all leaves that become attacked cut out and burned.

(*c*) All plants in the diseased area should, as a preventive, be sprayed repeatedly with Bordeaux mixture, particular attention being given to the younger leaves.

Bud-rot Disease.

A bud-rot disease was noticed in isolated cases in the Cedros district, and had apparently caused the death of many palms on a savannah in the Siparia district.

The cause of the trouble is somewhat obscure. The roots and stem of the palm appear to be quite healthy, while the bud is involved in a vile-smelling soft rot. In one instance, a fungus was present in the advancing margin of the diseased part, but generally bacteria were the only organisms present. Three kinds of bacteria were noticed, and two of them had previously been found in trees that were suffering from other causes. On no occasion could it be established, with certainty, how the bacteria gain an entrance, or whether they are the primary cause of the trouble.

In the Siparia district the spread of the disease was very rapid; but it is probable that more careful attention to cultivation, etc., and prompt destruction of all diseased material would tend to keep this disease well in hand.

Finally it must be urged that in dealing with the diseases of cocoanuts, the adoption of remedial measures must be carried out systematically by all interested in cocoa-nut cultivation; for, by cooperation of the planters in this matter, it would be possible to check the diseases and probably to eradicate them.

(*Agricultural News, West Indies*), *Vol. VI, No. 127, p. 75.*

BIBLIOGRAPHY.

Notes on Rubber Cultivation by Lieut.-Col. Wyllie and O. G. Ferreira.

This little book was originally compiled for publication in Portuguese only but an English edition has been brought out by Col. Wyllie, formerly in charge of the Rubber plantations in

Rangoon. There is little original matter in the book which treats of Hevea, Castilloa, Ceara rubber, Ficus elastica, Hancornia and some rubber vines. A rather curious standard table of Guttas and rubbers is given in the introduction, in which Hevea representing Standard rubber, Parameria, Castilloa and Chavannesia (Urceola) are given as second grade, Ceara, Ficus and Hancornia third grade. One would be inclined to reverse these two grades only leaving Castilloa in the second grade with the first two of the third grade Parameria and Urceola are hardly as good as Ficus or Ceara. With the standards of gutta percha, the arrangement is more curious *Dichopsis* gutta is given as first grade. *D. oblongifolia* (the same thing) *Payena Leerii* and *Willughbeia edulis*, (a rubber not a gutta nearly equal to Para) form the second grade. The account of Para rubber is poor and not up to date. The authors have apparently had access to a few works only on rubber cultivation, and practically know nothing of rubber cultivation in Malaya. A page or so is given to the subject of shade trees for Para rubber. This may be necessary in countries unsuited for the plant, but is not required in the rubber zone The spiral tapping system (now everywhere abandoned) is recommended.

The description of the tree is very inaccurate. Thus the flowers are not white as stated but yellow, the fruit is not yellow but green and is smaller than a garden tomato. The seed oil is not violet but brown or yellow, and the statement that "the germ contains an active purgative principle not found in the rest of the seed" which has of course to be removed before proceeding to extract the oil is certainly news to those who have often eaten the seed with impunity.

The authors think that Para rubber will do well in Portuguese India, for one specimen at least is over 25 feet tall though it is no more than 6 years of age! This would hardly be considered a great success in the Malay Peninsula.

Of the other rubbers Ceara, Ficus and Castilloa the accounts are chiefly extracted from well known publications. The authors, however, give some accounts of the *Mangabeira Hancornia*, a rubber tree little known, which has never been tried here not on account of its slow growth and poor rubber as the authors suggest but because seeds and plants were not procurable. It is, however, a sandy country, dry region plant, and is hardly suited for this wet region.

The Chapter on land tennure in India is useful for Indian planters, and the estimates of return to capital seem fairly reasonable In the scheme for a mixed plantation, to combine trees such as *Eriodendron* and *Bombax*, as a kind of catch crop does not commend itself, and to suggest that "such important trees" as *Pongamia glabra*, *Calophyllum inophyllum*, *Sterculia foetida* "might be made a valuable source of profit" is simply misleading. They are quite valueless trees.

The book contains numerous photographs the most interesting of which are those showing the root system of Hevea.

H. N. R.

CASUARINAS.

The order of plants known as *Casuarinæ*, comprises but one genus of very limited area *viz.* *Casuarina*. There are about 50 species in the genus, of which most are peculiar to Australia with a number occurring in New Caledonia, and a few in the Malay Islands.

The Casuarinas known here by the Malay name of Ru, or Javanese Eru, are trees of some size, with thin cylindric jointed branches, and no leaves unless certain little teeth at each joint of the branchlets represent these organs. The male flowers are borne in slender rusty brown spikes on the branchlets and the females in small cones. The fruit is a small woody cone containing flat one winged seeds, which are drifted away by the wind when the cone splits. In collecting seed for growing it is necessary to gather the cones when ripe but before they split or the seeds are blown away by the wind. The cones are laid out in a dry place to split on stiff paper and when split the seeds can be shaken out and collected.

Only one species is indigenous to the Malay Peninsula. *Casuarina equisetifolia*. This tree invariably occurs in a single line along the sea coast, above high water mark in sandy beaches. So regular is it in this that it often appears to have been planted in line. At Santubong in Sarawak, I have seen a line of these trees in a sandy spot some distance from the sea which has evidently receded from the trees, and left them some way inland. Except where planted one never sees these trees inland or away from the sea. Yet they grow very well away from the sea especially in dry exposed places and are frequently planted as roadside or shelter belt trees. There are some remarkably fine specimens by the sea at Malacca evidently of considerable age.

These plants are readily grown from seed, and grow very fast. Notes on the cultivation of *Casuarina equisetifolia*, have already been published in the Bulletin No. IV, 11, 57.

Few if any epiphytes seem able to grow on the bark, and it is well known that orchid planted on them never do well or live long. A fine species of *Loranthus*, occurs as a parasite, however, on the wild trees on the Pahang Coast (*L. Casuarinæ*).

The Casuarina is cultivated for ornament and for fire wood (*see* Bulletin I, 292. and also supplies a good and durable timber. At the end of the year its branches are often in request for Christmas trees, it being the only common plant which forms a satisfactory substitute for the Spruce fir used at home for this purpose. The boughs, however, are so thin that they require to be supported by thin strips of bamboo tied beneath them.

C. sumatrana, Miq. of which a photograph is given, is a remarkably handsome tree both in its young state as represented and in the adult state. It is a native of Sumatra and Borneo, where it grows in sandy woods above the sea, usually in hilly places. When young it has a rounded cone shaped outline, the lower branches lying on

or near the ground. Cultivated in the Botanic Gardens in stiff clay it has retained this appearance though over 20 years old. In Sarawak, near Mount Matang, and Santubong, it attains a very considerable height with a bare stem and an irregular somewhat flattened top quite resembling in outline a Scotch fir. It flowers and fruits regularly in the Botanic Gardens. The slender brownish yellow catkins of the male are produced in abundance on the ends of the deep green branchlets and give the tree a bright appearance. It is a much handsomer plant than *C. equisetifolia,* but seems to be very seldom cultivated as an ornamental plant.

SOME TIMBER NOTES.

Mussaendopsis Beccariana (*Rubiaceæ*) Malabera, a big tree over 100 feet tall about three feet through with obovate coriaceous deep green leaves 6 inches long and nearly as wide, opposite. Panicles 6 inches or more long, peduncle 4 inches long, branches spreading bearing lax cymes of small white flowers, one of each in which has an obovate white calyx lobe as in Mussaenda fruit.

This superb tree occurs in Singapore (Chan Chu Kang, RIDLEY 1850), Perak, Goping, Kinta (Kings coll). I have also met with it in the Kelantan river, in Siak, Sumatra, and it is also recorded from Borneo. It is, however, apparently not a very common tree.

The timber as sent by Mr. BURN-MURDOCH is light fawn colour with very numerous fine wavy rings, and very numerous close rays, the pores numerous, irregular and often in twos and threes annual rings tolerably distinct but very irregular and rather close so that it may be judged to be a slow growing tree. Weight per cubic foot 54 lbs.

The name Malbera is used in Malacca for the tree *Fagraea fastigiata* a very different tree.

Cumpassia parvifolia (*Leguminosæ*).—The Tualang is a well-known Borneo tree of great size, and specimens of wood and foliage of the Tulang of Selangor sent by Mr. BURN-MURDOCH, seem to belong to the same species. In habit the tree resembles much that of the Kempas *Cumpassia Malaccensis*, but the leaves are much smaller. The wood specimen sent is much closer grained than that of *C. Malaccensis* and resembles the wood of Merebau. It is dark red with rather large pores single double or in threes ; these are connected by wavy pale lines which frequently anastomose, and are often broken up into short bits, the rays are very fine and very close, annual rings not very conspicuous.

The timber is heavy 66 lbs. a cubic foot.

It is altogether a better class of timber than Kempas.

Parashorea stellata (*Dipterocarpeæ*) "Chengal."—This tree does not seem to have been often collected, but perhaps is not very rare. It occurs in Selangor and Perak, and is a tree 100 to 150 feet tall with a stem 4 or 5 feet through, the leaves are oblong acute or obtuse

with rather strong ribs, and about 4 inches long, the flowers dirty pale yellow with a silvery calyx.

The timber is fairly good of the Serayah class of timber light brown and rather light in weight. and by no means hard, pores extremely numerous and close medullary rays very numerous, close and fine annual rings very conspicuous and regular, pores very much more numerous in the period of rapid growth. Weight 50 lbs. per cubic foot.

Shorea glauca, "Balau."—This timber now called Balau is not the original timber of that name which is *Parinarium oblongifolium* though it is constantly sent under this name from the Rumpin River in Pahang whence the original Balau was derived. The genuine Balau is now, it seems, quite a rare tree. I have occasionally come across it in Singapore, Johor and elsewhere, it is easily recognized by its large leaves white beneath.

The tree having been almost exterminated, this timber (*Shorea glauca*) very inferior has been substituted. It is dark brown in colour and heavy with numerous crowded small pores, and close fine rays. In fact it much resembles the genuine Damar Laut (*Shorea utilis*). It is a good timber but for durability cannot be compared with the original timber known as Balau. Weight 69 lbs. per cubic foot.

Lumnitzera coccinea the Teruntum, (*Combretaceæ*). Mr. BURN-MURDOCH sends a good sample of this closegrained pale fawn coloured wood. The tree is conspicuous in the mangrove swamps from its tufts of brilliant red flowers.

Teruntum is a good useful wood being fairly strong and heavy. It is, however, rather liable to split. Weight 58 lbs. per cubic foot.

Beliau or Betis, *Dichopsis* sp.—This has already been described in the Bulletin. Mr. BURN-MURDOCH sends another specimen of the timber of really first class quality, a fine dark brown red heavy wood very compact, the pores very small in short rows, the transverse rings very fine and close and wavy. Weight 72 lbs. per cubic foot.

H. N. RIDLEY.

RUBBER INDUSTRY.

THE F. M. S. *vs.* CEYLON.

Mr. H. K. RUTHERFORD'S OPINION.

Mr. H. K. RUTHERFORD returned to Ceylon from the Federated States a few days ago, and will stay in the Isle of Spices about a month. Before going to the F. M. S. he visited the low-country properties of the C. T. P. Co. and other companies in which he is interested; and on the present occasion will inspect the upcountry ones. We have previously described the prominence of Mr. RUTHERFORD in Ceylon's and F. M. S. planting annals and his

views on the progress made by the Colony during the decade which had passed since his previous visit. What he has to say now will be equally interesting to our readers, and was given in an interview with a Times of Ceylon representative immediately after landing at Colombo. It reads as follows:—

"What do I think of the F. M. S. as a rubber-producing country?"

"I consider for the growing of Para plantation rubber it would be exceedingly hard to beat, but I have not seen Java. The trees seem to grow equally well on 'bukit' or hilly land as they do on the alluvial flat. On the former the work of opening up the land is not so expensive as it is on the flats which require costly drainage works. Some planters are of opinion that the rubber on the flat lands will prove the better 'milkers', while others hold a contrary opinion. I do not suppose there is really sufficient evidence one way or the other for any one to state the case with absolute certainty."

"How does the growth compare with Ceylon?"

"I went over several Ceylon estates before going to the F. M. S. and I have no hesitation in saying that the growth of, say, a 4-year old tree in Ceylon is a year behind one of the same age in the F. M. S. There is nothing, however, in this fact or any others which may shew in favour of the soil and climate of the F. M. S. being better for the more speedy development of the tree, to prove that more satisfactory commercial results will be obtained there as compared with Ceylon. A planter in choosing between the two countries has to decide, after weighing up all the *pros* and *cons,* which place is likely to give him the best return on his capital."

"Have you come to any conclusion on this important view of the question?"

"Well, I think it would be somewhat premature of me to do this until I have thoroughly digested the figures I have of the two countries, and even then one has to take into consideration the probabilities as to the future labour supply for this ever-extending cultivation, and which country is going to stand the strain best. Undoubtedly the cost of labour is much higher in the F. M. S. than in Ceylon. A Tamil gets 8½*d.* per day there as against 5½*d.* in Ceylon, and in the former country he does not perform anything like the same amount of work. European supervision also is on a much higher scale of salaries; there is also an export tax on rubber, and freights are higher. Against all this there may be the possibility of a higher yield of rubber per tree, but so far I have no proof of this.

"The opening out of new plantations is going merrily on. All over the country estates are being carved out of the jungle. Hitherto estates have been opened out in close promixity to the railway or alongside roads, but planters are gradually working outwards. I have no idea how many acres are being cleared for planting this year, but it must be very considerable.

The Land Terms of the Two Countries Compared.

"Are not the new land terms to some extent limiting the development of the industry?"

"Although the conditions now are a premium of $3 and $1 quit rent for six years, and $4 per annum thereafter, I do not think in the meantime it is checking enterprise. Roughly speaking, comparing it with freehold land in Ceylon at £5 per acre at 5 per cent per annum, a planter in both countries would have in 14 years expended the same amount on land purchase. I do not suppose anyone troubles himself much as to what is going to happen after that, although the F. M. S. planter would be paying 9*s.* 4*d.* per acre per annum, while his Ceylon brother would be free. It is difficult to get applications for land put through with expedition, but nothing like to the same extent as it is in Ceylon. I think this latter fact, more than anything else, is driving Capital away from Ceylon to the F. M. S. The difficulties placed in the way of the Ceylon planter in the acquisition of useless lands (I mean useless to the native), and in the speedy settlement of native claims, which a planter may desire to have settled before concluding the purchase, are little short of disgraceful in a first-class Crown Colony. The Government must be aware that thousands of acres of land in Ceylon, over which natives and Government alike have shadowy claims, will never be cultivated by the native either to his benefit or that of the State. It surely therefore is the duty of Government when they know there are men ready to develop these unproductive lands, to push forward the settlement of claims, and thus aid in the speedy development of this new industry in which Ceylon hopes to play such an important part."—"Times of Malaya," March 6, 1907.

CAMPHOR.

"The Camphor production in Ceylon is unfortunately still in a very bad way and although much attention has now for several years been given to this new cultivation it has not been possible to produce more than 1,000 kilos. If it is taken into consideration that more than 100 acres are planted with Camphor-trees the result must be called unsatisfactory. The principal difficulty lies in the lack of experience of the planters in the distillation." So says the Tropical Agriculturist of Feb. 1907, p. 64. An idea had been strongly prevalent that the Camphor industry in Ceylon had been immensely successful, of late years, a mistake undoubtedly due to the too sanguine statements in local newspapers. The very high price of Camphor at present has induced many to turn their attention to the product and it is being tried in various parts of the world with more or less promise of success. In California the tree seems to do well and experimental returns show that the Camphor produced is purer than Japanese Camphor. In Italy the tree is said to do everywhere except in the neighbourhood of the Alps. In

Tonkin it justifies the most sanguine expectations. The finest tree outside Japan that the Editor of this Bulletin has ever seen was one in Cornwall near Fowey. One would therefore hardly expect that the tree would thrive in the tropics so close to the Equator. However, several planters in the Peninsula are having a try with it. Seeds and plants were imported from Japan by the Botanic Gardens this and last year, and arrived in excellent condition. Mr. LARKEN notes that in Johor the seeds took a month to come up, but all are starting. Of course Camphor plants have been in the Botanic Gardens for many years but they have made very little growth, being still bushes of no great size. The soil, however, has doubtless much to do with this as all the plants were planted in stiff clay. They have never flowered or fruited. Perhaps these trees would do better in our hill regions, where the soil is lighter and more friable, we hardly think they will do much in the plains.

H. N. R.

A RUBBER FACTORY IN SINGAPORE.

The Netherland's Gutta Percha Company (Limited) has lately turned its attention to the manufacture of rubber tyres for carriages of all kinds, and under Mr. VAN RYN is enlarging its premises at Passir Panjang in Singapore. Machinery has been obtained and the work of making Carriage tyres has regularly commenced. Mr. VAN RYN manufactures tyres for carriages, rubber plates, valves, and will eventually manufacture other rubber goods for local consumption besides doing all kinds of refining work and other such businesses connected with rubber, for all of which he has a suitable plant. Some rubber scrap was supplied from the Botanic Gardens trees, as also some rubber clot, and from this he has turned out tyres which are the admiration of all who see them, and very superior to the usual rubber tyre in use in the East which is, we understand, made chiefly of African rubber.

The scrap says the manufacturer is extremely suitable for this work and requires much less treatment than the ordinary hard Para rubber of the Amazons. The clot rubber, that is the rubber which at certain times clots in the latex cups and cannot be made into picturesque-looking biscuits or sheet, seems as good if not better than the scrap.

There is a great field for such a factory in the East and it is unnecessary to point out the saving all round to planter, manufacturer and consumer, in avoiding the expense of having the rubber sent home to be made up and returned here in the form of tyres. Mr. VAN RYN is proposing shortly to make a tour of the planting districts to make arrangements for purchasing scrap rubber for the factory, and planters may soon have a chance of driving about their estates on tyres of rubber grown by themselves.

H. N. R.

DEPARTMENT OF AGRICULTURE, F. M. S.

Dr. W. J. GALLAGHER, a distinguished student at Queen's College, Cork, and a graduate of the Royal University of Ireland, has been appointed Mycologist to the Department of Agriculture, Federated Malay States. He has been engaged in research under Dr. HARTOG, Professor of Natural History, Queen's College, and obtained a research studentship from the Commissioners of the 1851 Exhibition which was renewed on account of the excellence of his first year's work. Dr. GALLAGHER has spent the last three months in a tour of the great Continental Universities to see the latest methods of investigation in plant, pathological and mycological laboratories and will take up his duties in the beginning of April.

The laboratories and offices of the Department of Agriculture, Federated Malay States, are approaching completion They are situated at the Rubber Experiment Plantations, Kuala Lumpur, and consist of a two-storey building 130 feet long, containing a capacious Chemical laboratory and other laboratories for the Director, the Government Mycologist, the Entomologist, the Superintendent's Experiment Station and other Scientific workers as well as Library and Offices.

The Department will be much helped in its work by getting into its new quarters the present temporary accommodation, as the Institute for Medical Research being quite inadequate, as well being four miles from the rubber experimental plots.

J. B. C.

COCO-NUT BEETLES IN THE PHILIPPINES.

In the "Philippines Journal of Science" Vol. I, No. 2, p. 143, is an useful article on the principal insects injurious to the coco-nut palm by Mr. C. S. BANKS. In the Philippines, the rhinoceros beetle *Oryctes rhinoceros* is as troublesome as it is here, and it is charged with eating the growing part of the bud when in the larval stage. The evidence for this is not very strong and may be doubted. It has never been known to do so here. The plan of creosting the insects in and leaving them in the tree is condemned on the ground that the decaying beetle would attract ants "Which in turn would draw other insects such as white ants." But this is the very reason for leaving the corpse in the hole, it does attract ants and no better guardians of the tree could be found, no other rhinoceros beetle, weevil or white ants can or will face the carnivorous ants. Where ants are seen there is no fear of other pests of this nature. The Philippines palm weevil is described and figured and identified as *Rhynchophorus ferrugineus*. It is, however, not identical with that of the Straits Settlements, being of quite different coloration and habits.

This beetle not only eats the shoot or growing point but completely tunnels out the tree hollowing it to the base. This we have never seen here. *R. ferrugineus* never attacks the base of the tree as this insect is said to do, nor is there any fear of its entering the trunk by wounds made by the tree-climbers. It invades the holes made by *Oryctes rhinoceros* but it more often attacks the shoot without requiring any assistance from wounds, of any kind.

Another *Rhynchophorus* is figured and described as attacking the tree which seems more to resemble *R. ferrugineus*.

Two other species of weevil are also described, which apparently chiefly attack trees already damaged by the other larger species.

H. N. R.

"Rubber Cultivation as an Investment."

A shilling pamphlet by the Editor of the "India-rubber Journal", and published by the Rubber Plantation Development and Estates Agency in London, gives an account of cultivation and preparation and uses of rubber, as well as calculations as to profits and valuation of estates and an useful section on How to read a Rubber cultivation Prospectus. The pamphlet is one which any one can read with profit short as it is. It is of course chiefly for investors and is certainly well suited for their needs. It contains a number of pictures showing cultivation methods, tools, etc., but some of the latter are fast going out of date. Spiral tapping, and the short taps are pretty well things of the past and perhaps few now use the Bowman and Northway knives, and pricker. However, this is of little importance as the book is a guide rather to investment than cultivation. The figures as to cost and profit are very moderate and give a very fair idea of what a planter or investor stands to gain.

H. N. R.

BIBLIOGRAPHY.

In the "Tropen Flanzer" for March, 1907, appears an account of Para-rubber in the Botanic Gardens, Singapore, by Dr. R. SCHLECHTER, under the title Uber *Hevea Braziliensis* in Singapore. It gives an account of growth, appearance of the trees, tapping, etc.

"Le Caoutchouc et la Gutta-percha" is a French Journal published monthly dealing with rubber and gutta-percha chiefly from the view of the manufacturer. It is edited by M. A. D. CILLARD, and contains articles by Mr. JUMELLE, PERRIER DE BATIIE and other authorities on rubber.

H. N. R.

EARLY FRUITING OF PARA RUBBER.

Visiting the now extensive rubber plantations at Castlewood, and Mount Austin on the Tebran river in Johor, Mr. BRYCE showed me

a little lot of trees of three and a half year old which had already commenced fruiting and also seedlings coming away nicely from the trees. These trees were about as big as good five year olds over eighteen inches at 3 feet from the ground. This is an unusually rapid development even for Para-rubber in the Peninsula.

H. N. R.

PARA RUBBER SEED OIL.

Some notes of interest on experiments made with oil from seeds of the Para rubber tree are contributed by Mr. L. WRAY to the Journal of the Federated Malay States Museum. He reports that, on an average, 1,000 husked and sun dried kernels were found to weigh $4\frac{1}{2}$ pounds avoirdupois. At an estimated 40 per cent of oil in the kernels, 1,000 seeds should yield 1 pound $12\frac{3}{4}$ ounces of oil. By the same figures, one ton of dried kernels would yield about $96\frac{1}{3}$ gallons of oil. According to Mr. Wray's observations, one tree may be expected to average over 1,000 seeds, though some will produce many more.

In order to procure the most valuable commercial oil, it was found necessary to put the kernels into the press immediately after they had been dried and pounded. Any delay tended to give the oil a darker and cloudy appearance. The longer it was kept the deeper became its colour. Some of the oil last expressed was quite thick. As it became viscid it was more difficult to express and required greater pressure to expel it from the cake. As these experiments were carried on with a locally made press without sufficient pressure to expel all the oil from the meal, it was found impossible to determine the comparative yield of the fresh and the old meal, but there appeared to be a much greater yield from the former.

There are on exhibition at the Perak Museum three samples of these oils. One is from freshly crushed seeds, one from seeds which had been crushed for about a week, and the third from seeds crushed about two weeks.—"Times of Malaya," March 6, 1907.

The Cultivation and great value of Paspalum Grass.

THE EDITOR, "AGRICULTURAL BULLETIN"
SINGAPORE, STRAITS SETTLEMENTS,
EAST INDIES.

Dear Sir,

I would esteem it a great favour if you would kindly publish the following information for me on the above subject as I feel certain it may prove of great value to many of your readers—Paspalum Grass has been cultivated on the North Coast of New South Wales for several years past.

Of this celebrated grass, W. S. CAMPBELL, Esq., Director of Agriculture, N.S.W., says:—"This grass has attained such remarkable prominence, and so many persons have become acquainted with its great value, and so much has been written about its merits, that anything one can write upon the subject seems to be superfluous." He also says, speaking of its introduction, "Gradually the farmers took to planting it, and as its excellent qualities became known the demand for seed and plants became enormous, and its name has now become familiar to every man, woman and child, not only in the Richmond and Tweed River districts, but all over the coastal districts of the State."

Mr. CAMPBELL, after his recent visit to these districts, also says: —"I have returned greatly impressed with the prosperity of the people in that part of the country. The Paspalum Grass grows with extraordinary luxuriance, and so high is the growth that if it stood up straight, the stock would be quite lost in it. As it is, though bending over with its own weight, in many places, only the backs of the cattle are visible. Apparently, the cattle are unable to eat it down, and I believe that it would sustain five or six head of stock per acre for several months. Farmers are doing wonderfully well, and land is bringing high figures."

This is the favourite grass with the stockowners here, and to the dairymen especially has proved a veritable gold mine. It produces an immense amount of succulent herbage, which is eagerly relished by all stock; grows from 5 ft. to 10 ft. high; bears a large quantity of seed, which can readily be disposed of at a good price; and thrives well almost anywhere. No other grass can equal it for rapid growth, quantity and quality of herbage, and its adaptability to almost any soil or climate; and the person who introduces this grass into his district will prove a benefactor not only to the locality in which he resides, but the Commonwealth generally. Any land on which paspalum is established is worth from £10 to £20 per acre.

Once established, this grass remains permanent for all time, and saves the farmer from the great annual expense entailed in the purchase and cultivation of other grass seeds. In the Tweed district (N.S.W.) the seed is sown after the scrub or other growth has been felled and fired, at the rate of about 10 lbs. to 15 lbs. of seed per acre. Where there is much moisture, the grass will, within a few months, be several feet high, and laden with seed. In the dry districts the seed should be sown in Autumn, when the weather is cooler, and when there is a probability of getting rain.

This grass has proved very effectual in preventing and subduing noxious growth of all kinds, and to those landowners who are troubled with the persistent and expensive growth of ferns or thistles, etc., it would prove a great blessing; but it should not be sown on land intended for the cultivation of other crops, as it is a very prolific seeder, and when once established is very difficult, if not impossible, to eradicate. There are good paddocks of this

grass on the Tweed that have been in existence for the past 10 or 12 years. It has been known to yield, at the Wollongbar Experimental Farm, on cultivated ground, when four months old, 22 tons of green fodder, and several successive cuttings of over 13 tons each per acre, within the year. On fairly rich soil, where there is a good rainfall, this grass should easily sustain one bullock or 10 sheep per acre, and from 50 to 100 pigs could be kept in good condition on a few acres, with the addition of some skim milk or other feed. All persons who have used it for this purpose speak very highly of it.

This is what Mr. C. F. JULIUS, Secretary Dairymen's Union, Bucca Creek, says in the (Government "Agricultural Gazette,") N.S.W.:—"This remarkable plant is quickly coming to the forefront as a grass peculiarly adapted to our uncertain climate. Being a deep-rooter, its properties as a drought resister alone proclaim it invaluable; and while throughout the warmer seasons of the year it surpasses all other grasses in the rapidity and abundance of its growth, the severest of our frosts, although retarding its growth, fails to subdue its evergreen state It is most efficacious in subduing and preventing the growth of all noxious weeds. By the assistance of paspalum dilatatum many lands hitherto deemed worthless in their rocky, hilly or swampy situation have been triumphantly reclaimed."

The (Agricultural *Government Gazette*) says:—"Throughout the length and breadth of the Northern Dairy Districts, paspalum grass is regarded as the king of pasture grasses, and at present it has, no doubt, every claim to such a position."

Mr. H. MUNSEY, of Dundas (N.S.W.) says:—"Paspalum is the grass that has revolutionised the dairying industry on the North Coast. Scores of instances can be quoted showing that the capacity of farms has been doubled and trebled and it forms a dense mass of succulent forage. Having spent over a month going through farms where this grass has been sown, I can safely recommend its planting on a large scale. I have seen farms where 100 head of dairy cattle have been kept all the year round on less than 100 acres of land, giving splendid returns in milk and butter. This grass if enclosed for a short period during Autumn will provide a good supply of feed for the Winter. Its value to the State cannot be expressed in thousands of pounds."

Mr. BRANDON, the well-known Manager of the North Coast Co-operative Butter Factory, says of paspalum:—"I do not know what this district would have done without it, especially during the very dry weather we experienced some time back. With regard to the quality of the butter manufactured from it, it is all that could be desired."

This factory, which was established about ten years ago, and is owned and controlled by our farmers, for the month of October last, paid away to its suppliers for cream and pork the immense sum of £45,000, or at the rate of more than half a million sterling

per annum. Nearly all the cows from which the milk is obtained for this factory are grazed on paspalum, and very few of them are either hand-fed or housed during the winter months.

Mr. JAS. KING, President of the Tweed Dairymen's Union, says "That to write of the merits of paspalum would require a newspaper."

In conclusion Mr. Editor, and thanking you in advance, I beg to say, I will be only too pleased to give any of your readers further information if they send postage for reply to,

Yours faithfully,
B. HARRISON.

30th January, 1907.

GOW, WILSON & STANTON, LIMITED—
India Rubber Market Report.

13, ROOD LANE, LONDON, E. C.
March 15th, 1907.

At to-day's auction, 527 packages of Ceylon and Malaya Plantation grown rubber were under offer, of which about 433 were sold. The total weight amounted to about 24½ tons, Ceylon contributing nearly 6½, and Malaya over 18 tons.

There was a good demand for all descriptions at about last sales rates, though biscuits and sheet where, the quality was not quite up to the finest, were inclined to be slightly easier.

Fine crepe was again the chief feature, both in the strip and block form, and the highest figure mentioned was 5/10¾, which was offered for some very pale block crepe from Linggi Estate.

A parcel of nice clean Rambong crepe realised 5/0¼ and there was a good enquiry for scrap.

QUOTATIONS.—Good to Fine block, 5/9¾ to 5/10¾ bid.
Fine sheet, 5/8 to 5/8¾.
Fine biscuits, 5/7¼ to 5/8¾.
Crepe { Very fine pale, 5/9 to 5/10½ bid.
Palish to darkish, 5/5 to 5/8½.
Dark pressed and block, 4/7 to 5/3¾.
Rambong, 5/0¼.
Scrap { Fine, 4/7 to 4/8.
Fair to medium, 4/3 to 4/6.

PLANTATION FINE TO-DAY.—5/8 to 5/10¾, same period last year, 6/2 to 6/3½.

Do. SCRAP.—4/6 to 4/8, same period last year, 4/11 to 5/3½.

FINE HARD PARA (South American).—5/1¼, same period last year, 5/4½.

Average Price of Ceylon and Malaya Plantation Rubber.

433 packages at 5/5¾ per lb., against 121 packages at 6/0½ per lb. same period last year.

Particulars and prices as follows :—

Ceylon.

Mark.	Quantity, Description and Price per lb.
Ederapolla	1 case good biscuits, 5/7¾. 1 small box scrap, bought in.
Kipitigalla	27 cases fine amber sheet, 5/8¾. 1 case good palish to darkish biscuits, 5/8½. 1 case rejected biscuits, bought in.
CL	9 cases darkish crepe, 5/4½. 11 cases dark, 5/3. 1 case black pressed crepe, 4/10¾. 3 cases fine pale scrap, 4/7¾. 5 cases little darker, 4/7. 8 cases darkish heated scrap bought in. 1 case rejections, bought in. 1 case rejected biscuits, bought in. 2 cases low scrap, bought in. 1 case lump scrap, bought in. 1 case lump and ball scrap, bought in.
Ellakande	1 case good pale and darkish biscuits, 5/8½. 2 cases good scrap, 4/7½. 2 cases dark pressed crepe, 5/3¾. 1 case black, 4)7. 1 case fine palish biscuits, 5/8¾.
Langsland	11 cases fine palish to darkish biscuits, 5/8¾. 2 cases scrap and rejections, 4/8.
J V V & Co.	3 cases low scrap, 4/8. 1 case scrap, bought in. 2 cases pressed scrap, bought in. 1 case darkish scrap, 4/7¾.
Glanrhos	5 cases good palish to darkish biscuits, 5/8¾. 12 cases good darkish crepe, 5/4¼.
Ambatenne	3 cases good darkish biscuits, 5/8½. 1 case low scrap, bought in.
Palli	4 cases good Ceara biscuits, 5/8½. 3 cases ditto sheet, 5/8½. 1 bag rejections, 2/2.
Densworth	2 cases good darkish biscuits, 5/8½. 1 bag good rejections, 4/5. 1 bag fine pale scrap, 4/8. 1 case barky scrap, 4/5¾. 1 bag low scrap, 3/3.
Ambanpitiya	1 case good biscuits, 5/8½.
Tallagalla	3 cases good darkish biscuits, 5/8½. 3 cases good pressed scrap, 4/7½.
Ayr	1 case fine darkish biscuits, 5/8½.
Taldua	4 cases good dark biscuits, 5/8. 1 case good scrap, 4/7½.
D B M	2 cases pressed heated scrap, bought in.
Sorana	1 case very fine palish biscuits, 5/8¾. 1 case similar, 5/8¾. 1 case good darkish, 5/8½.
Waharaka	1 case good dark biscuits, 5/8¼. 2 cases low scrap, 4/7.
Rangbodde	1 case exceptionally fine pale biscuits, 5/9¼.
B B & Co.	1 case fine palish crepe, bought in. 1 bag darkish, bought in.
V B	1 case fine amber sheet, 5/8½.

Malaya.

Mark.	Quantity, Description and Price per lb.
Highland Est.	18 cases fine washed sheet, 5/8¼. 10 cases fine palish crepe, 5/6¼. 9 cases little darker, 5/4¼. 6 cases dark, 5/2¾. 3 cases brown, 5/3. 12 cases fine palish washed sheet, 5/8½. 6 cases darker, 5/8½. 7 cases fine palish crepe, 5/6½. 2 cases good darkish, 5/5. 1 case brown, 5/3. 2 cases Rambong, 5/0¼. 1 case pressed ditto, 4/9.
C M R E Ld.	33 cases fine palish crepe, 5/8½. 12 cases fine palish to darkish, 5/7. 1 case good dark, 5/2.
Batu Tiga	2 cases good palish to darkish biscuits, 5/8½.
Klang FMS	25 cases fine palish crepe, bought in. 5 cases fine palish to darkish crepe, 5/5¾. 2 cases good palish block, 5/9¾. 3 cases dark, 5/3¼. 5 cases darkish, 5/2 to 5/3¼. 32 cases fine pale crepe, 5/8¾ to 5/9. 3 cases fine palish to darkish, 5/7. 6 cases dark block, 5/3¾. 4 cases paler, 5/1¾.

Mark.	Quantity, Description and Price per lb.
S R Co.	9 cases fine amber sheet, 5/8½ to 5/8¾. 5 cases fine pale and palish crepe, 5/9. 1 case palish and darkish, 5/5. 8 cases dark, 5/2¾. 1 case brown, 5/4¼. 8 cases black, 5/1.
E B & Co.	3 cases fine palish sheet, 5/8¾. 3 cases darker, 5/8½. 1 case fine scrap, 4/7¾. 1 bag rejections, 4/6 9 cases fine amber sheet, 5/8½. 8 cases darker, 5/8½. 1 case rejections, 4/3. 2 cases good scrap, 4/8. 1 bag rough sheet, 4/4. 1 case good dull sheet, 5/8. 1 case rejections, 4/6.
Linggi Plantations Ld.	21 cases very fine pale crepe, bought in. 3 cases fine palish to darkish crepe, 5/8. 3 cases very fine pale blocked crepe, bought in. 8 cases dark block crepe, bought in. 5 cases very fine pale and palish crepe, bought in. 3 cases fine palish to darkish, 5/8.
McI	3 cases good dark biscuits, 5/8. 1 bag rough biscuits, 5/7¼. 2 cases good dark scrap, 4/7¾. 2 cases thick uncured biscuits, 4/6½.
J E	8 cases fine amber sheet, 5/8¼. 1 case fine palish scrap, 4/8. 7 cases pressed scrappy sheet, 4/[illegible]½ to 4/8½.
B & D	1 case good Rambong scrap, 3/9. 1 case good palish biscuits 5/6. 1 bag Rambong, 3/6. 1 bag rejections, 4/7. 1 bag, block crepe, and pieces, 4/4½. 1 bag very fine pale sheet, 5/9. 1 bag rough sheet, 5/3. 1 bag rejections, 4/-. 1 bag good rough sheet, 4/9.
B M & C S	1 case good palish crepe, 5/7½. 7 cases darkish, 5/4.
B M & C P	4 cases good dark biscuits, 5/7½
S B C CKC	2 cases fine amber sheet, 5/8¼.
Bukit Dugong SP	2 cases good pressed scrappy crepe, bought in.

GOW, WILSON & STANTON, LIMITED—
India Rubber Market Report.

13, Rood Lane, London, E. C.
March 26th, 1907.

At to-day's auction, 428 packages of Ceylon and Malaya Plantation grown rubber were under offer, of which about 329 were sold. The total weight amounted to about 26¼ tons, Ceylon contributing about 5½, and Malaya over 20¾ tons.

Competition was not quite so general as at the last auction, no doubt to some extent owing to the near approach of the Easter holidays. Fine block was again in request, a large parcel from Lanadron Estate (Johore) realising from 5/11 to 5/11½ per lb., this being the highest price of the auction.

The finest grades of crepe mostly changed hands at about last rates, but the lower kinds were somewhat irregular. Quotations for fine sheet shewed little change, but scrap was rather less enquired for.

QUOTATIONS.—Good to Fine block, 5/9 to 5/11½.
Fine sheet, 5/7¾ to 5/8¼.
Fine biscuits, 5/7¾ to 5/8½.
Crepe { Very Fine pale, 5/9 to 5/10.
Palish to darkish, 5/3¼ to 5/8¾.
Dark, pressed, and block, 4/8½ to 5/4¼.
Scrap { Fine, 4/5 to 4/7.
Fair to medium, 4/4 to 4/4¾.

PLANTATION FINE TO-DAY.—5/7¾ to 5/11½, same period last year, 6/2¾ to 6/3¼.

PLANTATION SCRAP.—4/5 to 4/7, same period last year, 4/5 to 5/5.

FINE HARD PARA (South American).—5/-, same period last year, 5/5¼.

AVERAGE PRICE OF CEYLON AND MALAYA PLANTATION RUBBER.

329 packages at 5/6½ per lb., against 100 packages at 5/11 per lb. same period last year. Particulars and prices as follows :—

Ceylon.

MARK.	QUANTITY, DESCRIPTION AND PRICE PER LB.
Kumbukkan	3 cases fine darkish biscuits, 5/8. 1 case good scrap, 4/4. 1 bag pressed lump scrap, bought in.
Elkadua	1 box good Ceara biscuits and block (uncured), bought in.
Kahawattee	1 box good Ceara biscuits, bought in.
Sorana	2 cases fine palish biscuits, 5/8 to 5/8½. 1 case darker 5/8.
Waharaka	2 cases good dark biscuits, 5/8.
Doranakande	7 cases good dark biscuits, 5/8. 3 cases fine palish scrap, 4/7. 2 cases rejections, 4/4¼. 1 case pieces, 4/2.
Arapolakande	9 cases fine dark biscuits, 5/8. 1 case fine amber biscuits, 5/8. 2 cases fine scrap, 4/5.
Glencorse	1 case fine palish to darkish biscuits (pressed and rolled), 5/7¾. 1 case rejections, 4/4½. 1 case good pressed scrap, 4/5½.
Hattangalla	4 cases fine pale biscuits, 5/8. 1 case fine palish and darkish crepe, 5/3¼. 1 case dark pressed crepe, 4/9. 1 case black pressed crepe, 4/9.
Culloden	3 cases fine palish to darkish biscuits, 5/8¼. 1 case fine pale and dark block, 5/9. 1 bag fine pale rolled crepe, bought in. 1 case good palish to darkish crepe, 5/1½. 13 cases fine pale and palish crepe, bought in. 1 case good darkish crepe, 5/3¼. 1 case good dark block and pressed crepe, 4/8½. 1 case dark pressed crepe, 4/8½. 3 cases fine pale and darkish biscuits, bought in. 10 cases fine pale and palish crepe, bought in.
Ingoya	7 cases very fine palish biscuits, 5/8¼. 1 case good pressed scrap and cuttings, 4/5.
J J V & Co.	1 case rejections, bought in. 1 case pressed scrap, bought in. 1 case rejections, bought in. 1 case barky scrap, bought in. 1 case rejections, bought in. 1 case good biscuits, scrap, and rejections, bought in. 1 case good wound scrap, bought in. 2 cases good pressed scrap, bought in.

Mark.	Quantity, Description and Price per lb.
Kumaradola	1 case fine palish biscuits, 5/8. 3 cases somewhat similar, 5/8. 1 case cuttings, 4/5½.
Goonambil	1 case dull biscuits, 5/8. 1 bag good rejected biscuits, 5/2 1 box good palish scrap, 4/4.

Malaya.

Mark.	Quantity, Description and Price per lb.
Highlands Est.	2 cases fine washed sheet, 5/7¾. 9 cases darker, 5/7¾. 6 cases fine palish to darkish crepe, 5/4. 12 cases good brownish, 5/3. 11 cases good dark, 5/1¾. 6 cases good brown, 5/2. 5 cases fine washed sheet, 5/8. 3 cases darker, 5/8. 2 cases fine palish crepe, 5/4¾. 2 cases good darkish crepe, 5/1¾. 1 case good dark, 5/1¾. 6 cases good brown, 5/1¾.
B R R Co Ld.	43 cases fine amber sheet, 5/8 to 5/8¼. 6 cases fine palish to darkish crepe, 5/8. 3 cases fine palish crepe, 5/8. 1 case fine dark block, 5/9. 6 cases darker, 5/9¼. 2 cases good palish to darkish crepe, 5/5. 4 cases palish to darkish, 5/3¾. 8 cases good darkish, 5/1¾. 2 cases good dark, bought in. 5 cases good dark block, 5/4¼. 4 cases good dark crepe, 5/1¾. 4 cases good brown, 5/2.
F (S) R Co Ld.	4 cases fine amber sheet, 5/8. 3 cases dark mixed block, 5/2.
M	2 cases fine amber sheet, 5/8 to 5/8¼. 1 case good wound scrap, 4/4¾. 1 bag earthy ball scrap, bought in. 1 bag dark pressed crepe, bought in.
L E Muar Straits	41 cases very fine block, part sold, 5/11 to 5/11½. 1 case very fine pale crepe, 5/10. 11 cases fine palish and brownish crepe, 5/3.
V R CO Ld. Klang FMS	20 cases fine pale crepe, bought in. 7 cases good dark smoked block, 5/5. 3 cases brown block, 5/2½.
P S E	12 cases fine amber sheet, 5/8 to 5 8¼. 2 cases good dark blocked scrap, 4 4¼.
K	1 case fine palish rolled crepe, 5 4¾. 1 case good darkish, 5/3.
S	5 cases fine amber sheet, 5/8. 2 cases rejected sheet, bought in.
Jebong	22 cases very fine pale crepe, 5/9. 3 cases fine darkish and dark, bought in. 1 case good darkish, bought in. 1 case fine palish to darkish, bought in. 1 case good dark, 5/1½. 1 case fine amber sheet and biscuits, bought in.
C M R E Ld.	8 cases fine palish to darkish crepe, 5/8¾. 4 cases good greyish and brownish, bought in. 9 cases good dark, bought in.

Lewis and Peat's Ceylon, Straits and Malay States Plantation Rubber Report.

15th March, 1907.

The following lots, comprising about 6 tons Ceylon and 18 tons Straits, were offered at auctions to-day, and sold as follows:—

Straits and Malay States.

Mark.	Quantity,		Description		and Price per lb.
MCL	3	Cases	small dark biscuits	@	5/8
J E	2	,,	Darkish scrap	,,	4/7¾
	2	,,	Virgin biscuits	,,	4/6½
	8	,,	Large darkish sheets	,,	5/8¼
	1	,,	Fair brown scrap	,,	4/8
	7	,,	Scrappy sheets	,,	4/7½ @ 4/8½
B & D	1	,,	Red Rambong	,,	3/9
B M & Co.	1	,,	Good palish crepe	,,	5/7½
S	7	,,	Mottled and dark crepe, rather sticky	,,	5/4
B M & Co. P	4	,,	Dark biscuits improperly dried	,,	4/7½
C K C	2	,,	Palish sheets	,,	5/8¼
	1	,,	Brown scrap in cakes	,,	4/7
SP	2	,,	Brown pressed scrap	,,	bought in.
Highlands Estate	36	,,	Darkish rolled sheets	,,	5/8¼ @ 5/8½
	26	,,	Mottled crepe	,,	5/4¼ @ 5/6½
	6	,,	Black and dark crepe	,,	5/2¾
	4	,,	Brown chip crepe	,,	5/3
	2	,,	Scrap crepe	,,	5/5
	2	,,	Rambong crepe, mauve and red	,,	5/0¼
D	1	,,	Dull crepe	,,	bought in.
L	9	,,	Dull crepe	,,	bought in.
C M R E Ltd.	33	,,	Good pale crepe	,,	5/8½
	12	,,	Mottled mixed	,,	5/7
V R Co Ld. Klang FMS	57	,,	Pale crepe (32 sold)	,,	5/8¾ @ 5/9
	5	,,	Mottled crepe	,,	5/5¾
	2	,,	Pressed crepe	,,	5/9¾
	8	,,	Brown and black pressed	,,	5/2 @ 5/3¼
	10	,,	Brown and black block	,,	5/1¾ @ 5/3¾
S R Co.	9	,,	Rolled sheets	,,	5/8½ @ 5/8¾
	5	,,	Good pale crepe	,,	5/9
	2	,,	Mottled crepe	,,	5/4¼ @ 5/5¼
EB & Co.	8	,,	Dark crepe	,,	5 2¾
	8	,,	Chip and scrap	,,	5/1
	6	,,	Pale mixed sheets	,,	5/8½ @ 5/8¾
	9	,,	Palish sheets	,,	5/8½
	8	,,	Very rough sheets	,,	5/8½
Linggi	21	,,	Fine pale crepe	,,	5/10 bid.

Mark.	Quantity, Description and Price per lb.			
Plantations Ltd.	3	,,	Mottled crepe ... ,,	5/8
	3	,,	Pale blocked crepe ... ,,	5/10¾ bid.
	8	,,	Dark blocked crepe ... ,,	bought in.
	5	,,	Fine pale blocked crepe ... ,,	5/10½ bid.
	3	,,	Mottled blocked crepe ... ,,	5/8
V R Co Ld. Klang F M S	2	,,	Pressed crepe ... ,,	5/9¾

Ceylon.

Ambatenne	3	Cases	darkish biscuits ... ,,	5/8½
	1	,,	Dirty scrap ... ,,	bought in.
Palli	4	,,	Pale Ceara biscuits ... ,,	5/8½
	3	,,	Palish amber sheets ... ,,	5/8½
Densworth	2	,,	Biscuits, mixed colors ... ,,	5/8½
	1	Bag	Pale scrap ... ,,	4/8
	1	Case	Rather barky ... ,,	4/5¾
	1	Bag	Slightly dirty ... ,,	3/3
Ambanpitiya	1	Box	Mottled biscuits ... ,,	5/8½
Tallagalla	3	Cases	Dark biscuits ... ,,	5/8½
	3	,,	Brown scrap ... ,,	4/7½
Ayr	1	,,	Darkish amber biscuits ... ,,	5/8½
Taldua	4	,,	Dark biscuits ... ,,	5/8
	1	,,	Brown scrap ... ,,	4/7½
D B M	2	,,	Black Rambong heated ... ,,	bought in.
Sorana	2	,,	Fine palish biscuits ... ,,	5/8¾
	1	,,	Rather darker biscuits ... ,,	5/8½
Waharaka	1	,,	Dark biscuits ... ,,	5/8¼
	2	,,	Brown scrap ... ,,	4/7
Rangbodde	1	,,	Very fine pale Ceara biscuits ... ,,	5/9¼
B B & Co.	1	,,	Pale crepe ... ,,	5/9 bid.
V B	1	,,	Darkish sheets ... ,,	5/8½
Ederapolla	1	,,	Very mixed biscuits ... ,,	5/7¾
Batu Tiga	2	,,	Amber biscuits ... ,,	5/8½
Kepitigalla	27	,,	Large darkish sheets ... ,,	5/8¾
C L	1	,,	Small mixed biscuits ... ,,	5/8½
	12	,,	Mottled scrap crepe (3 sold) ... ,,	5/4½
	11	,,	Darker scrap crepe ... ,,	5/3
	1	,,	Black chip blocked ... ,,	4/10¾
	3	,,	Pale scrap ... ,,	4/7¾
	5	,,	Barky scrap ... ,,	4/7
Ellakande	2	,,	Mixed biscuits ... ,,	5/8½ @ 5/8¾
	2	,,	Brown scrap ... ,,	4/7½
	2	,,	Pressed scrap crepe ... ,,	5/3¾
	1	,,	Black chip ... ,,	4/7
Langsland	11	,,	Palish biscuits ... ,,	5/8¾
	2	,,	Brown scrap ... ,,	4/8
J J V & Co.	3	,,	Brown scrap ... ,,	4/8
	2	,,	Pressed scrap ... ,,	bought in.
	1	,,	Brown scrap ... ,,	4/7¾
Glanrhos	5	,,	Dark biscuits ... ,,	5/8¾
	12	,,	Scrap crepe ... ,,	5/4¼

Malacca.

Abstract of Meteorological Readings for the month of January, 1907.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Durian Daun Hospital	Barometer out of order.	141·8	81·4	90·1	74·6	15·5	75·9	·789	62·6	68	N.W.	4·68	1·89

COLONIAL SURGEON'S OFFICE,
MALACCA, 14*th March*, 1907.

F. B. CROUCHER,
Colonial Surgeon, Malacca.

Penang.

Abstract of Meteorological Readings in the Criminal Prison Observatory for the month of February, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Mean Maximum.	Mean Minimum.	Mean Range.	Mean Wet Bulb.	Mean Vapour Tension.	Mean Dew Point.	Mean Humidity.			
	Ins.	°F	°F	°F	°F	°F	°F	°F	°F	%		Ins.	Ins.
Criminal Prison Observatory, Penang ...	29·913	152·3	79·5	90·6	71·9	18·7	74·5	·757	71·05	70	N.W	80	50

Colonial Surgeon's Office,
Penang, *12th March*, 1907.

M. E. SCRIVEN,
Assistant Surgeon.

T. C. MUGLISTON,
Colonial Surgeon, Penang.

Selangor.

Abstract of Meteorological Readings in the various Districts of the State for the month of February, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature. Mean Dry Bulb.	Temperature. Maximum.	Temperature. Minimum.	Temperature. Range.	Hygrometer. Mean Wet Bulb.	Hygrometer. Vapour Tension.	Hygrometer. Dew Point.	Hygrometer. Humidity.	Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
General Hospital, Kuala Lumpur	29·882	149·4	80·3	90·3	70·9	19·4	76·0	0·815	73·1	78	Calm.	4·02	1·85
Pudoh Gaol Hospital ,, ...	...	...	...	...	...	...	...	...	...	...	...	4·66	2·27
District Hospital ,, ...	...	...	...	...	...	...	...	...	...	...	...	2·50	0·73
,, Klang	...	...	...	87·6	70·4	17·2	...	...	...	...	...	8·12	3·20
,, Kuala Langat	...	...	...	...	...	...	...	...	...	...	...	3·59	0·82
,, Kajang	...	...	...	91·0	69·0	22·0	...	...	...	...	...	5·34	2·82
,, Kuala Selangor	...	...	...	...	...	...	...	...	...	...	...	5·44	1·20
,, Kuala Kubu	...	...	...	...	...	...	...	...	...	...	...	5·72	2·26
,, Serendah	...	...	...	...	...	...	...	...	...	...	...	1·91	0·44
,, Rawang	...	...	...	90·5	69·8	20·7	...	...	...	...	...	5·95	1·65
Beri-beri Hospital, Jeram	...	...	...	...	...	...	...	...	...	...	...	5·60	1.50
Sabah Bernam	...	...	...	...	...	...	...	...	...	...	...	1·72	0·82

STATE SURGEON'S OFFICE,

KUALA LUMPUR, 13*th March*, 1907.

E. A. O. TRAVERS,

State Surgeon, Selangor.

Perak.

Abstract of Meteorological Readings in the various Districts of the State for the month of February, 1907.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Taiping	...	151	81·60	92	68	24	76·78	858	...	80	...	6·41	1·32
Kuala Kangsar ...	...	...	80·95	93	65	28	76·17	839	...	79	...	5·51	1·60
Batu Gajah ...	...	...	81·26	94	65	29	75·41	802	...	75	...	4·99	2·85
Gopeng ...	...	...	81·24	92	63	29	75·19	794	...	74	...	3·95	1·15
Ipoh ...	...	...	79·96	91	70	21	75·36	819	...	79	...	5·20	1·70
Kampar ...	...	...	79·35	90	68	22	75·62	837	...	84	...	9·44	2·59
Teluk Anson ...	...	...	81·35	91	65	26	76·50	850	...	80	...	8·58	2·24
Tapah ...	...	...	80·46	92	66	26	75·60	822	...	79	...	3·31	0·74
Parit Buntar ...	...	...	81·63	91	67	24	76·37	839	...	78	...	3·76	1·62
Bagan Serai ...	...	...	81·18	92	66	26	76·19	837	...	78	...	3·57	1·58
Selama ...	...	...	82·09	94	66	28	76·23	827	...	76	...	7·05	1·68

STATE SURGEON'S OFFICE,
TAIPING, 11*th March*, 1907.

S. C. G. FOX,
Acting State Surgeon, Perak.

Penang.

Abstract of Meteorological Readings in the Criminal Prison Observatory for the month of March, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Mean Maximum.	Mean Minimum.	Mean Range.	Mean Wet Bulb.	Mean Vapour Tension.	Mean Dew Point.	Mean Humidity.			
	Ins.	°F	°F	°F	°F	°F	°F	°F	°F	%		Ins.	Ins.
Criminal Prison Observatory	29·910	154·6	80·9	90·8	74·0	16·8	76·5	·831	73·0	74	North	6·43	1·65

COLONIAL SURGEON'S OFFICE,
PENANG, 10th April, 1907.

M. E. SCRIVEN,
Assistant Surgeon.

T. C. MUGLISTON,
Colonial Surgeon, Penang.

Malacca.

Abstract of Meteorological Readings for the month of March, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
		°F	°F	°F	°F	°F	°F	°F	%	%		Ins.	Ins.
Durian Daun Hospital ...	Barometer out of order.	144·3	80·0	88·3	74·2	14·5	77·2	·867	71·2	78	N.W.	3·38	·75

Colonial Surgeon's Office,

Malacca, *April*, 1907.

F. B. CROUCHER,

Colonial Surgeon, Malacca.

Perak.

Abstract of Meteorological Readings in the various Districts of the State for the month of March, 1907.

DISTRICT.	Maximum in Sun.	Temperature.				Hygrometer.			Total Rainfall.	Greatest rainfall during 24 hours.
		Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Humidity.		
Taiping ...	152	18·24	91	72	19	77·62	899	85	19·76	3·60
Kuala Kangsar ...	...	78·93	95	70	25	76·19	868	88	5·80	1·50
Batu Gajah ...	163	80·96	93	70	23	76·38	850	80	8·75	2·31
Gopeng ...	...	81·33	92	65	27	75·80	826	77	9·52	1·35
Ipoh ...	...	81·62	97	74	23	77·36	882	82	10·23	2·34
Kampar ...	...	79·78	90	70	20	76·73	879	87	20·18	6·12
Teluk Anson ...	...	82·15	93	64	29	77·12	862	79	5·05	2·25
Tapah ...	..	80·60	92	68	24	76·36	851	81	11·31	2·51
Parit Buntar ...	...	81·59	91	70	21	76·81	859	80	5·49	1·62
Bagan Serai ...	...	81·79	91	70	21	76·83	855	79	5·58	1·06
Selama ...	...	80·83	93	71	22	76·83	869	83	12·97	2·76

STATE SURGEON'S OFFICE,

TAIPING, *23rd April*, 1907.

S. C. G. FOX,

Acting State Surgeon, Perak.

Selangor.

Abstract of Meteorological Readings for the month of March, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
General Hospital, Kuala Lumpur	29·870	143·7	80·2	90·5	71·5	19·0	76·1	0·826	73·4	80	S. W.	9·21	1·30
Pudoh Gaol Hospital ,, ...	...	...	...	...	...	...	...	...	...	...	...	5·91	1·35
District Hospital ,, ...	...	...	...	...	...	...	...	...	...	...	...	7·34	0·84
,, Klang	...	...	...	87·8	71·5	16·3	...	...	...	...	...	6·04	2·32
,, Kuala Langat	...	...	...	...	...	...	...	...	...	...	...	1·65	0·75
,, Kajang	...	...	...	91·8	71·3	20·5	...	...	...	...	...	4·88	1·71
,, Kuala Selangor	...	...	...	...	...	...	...	...	...	...	...	3·84	0·95
,, Kuala Kubu	...	...	...	...	...	...	...	...	...	...	...	8·55	2·32
,, Serendah	...	...	...	...	...	...	...	...	...	...	...	12·79	2·02
,, Rawang	...	...	...	91·6	71·4	20·2	...	...	...	...	...	11·30	2·10
Beri-beri Hospital, Jeram	...	...	...	...	...	...	...	...	...	...	...	2·37	0·60
Sabah Bernam	...	...	...	...	...	...	...	...	...	...	...	3·22	1·12

STATE SURGEON'S OFFICE,

KUALA LUMPUR, 20th *April*, 1907.

E. A. O. TRAVERS,

State Surgeon, Selangor

Pahang.

Abstract of Meteorological Readings in the various Districts of the State for the month of March, 1907.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Kuala Lipis ...	...	...	...	93·0	68·0	20·14	...	...	...	...	...	3·12	1·25
Raub ...		...	...	93·5	70·0	13·65	...	...	...	...	...	3·75	·55
Bentong ...	...	...	...	92·5	68·0	17·29	...	...	...	...	...	7·28	2·16
Temerloh ...	...	...	...	90·0	72·0	13·03	...	...	...	...	...	4·73	2·33
Pekan ...	...	...	...	88·0	71·0	12·03	...	...	...	...	...	11·75	6·23
Kuantan ...	...	...	...	90·0	67·0	17·76	...	...	...	...	...	7·45	2·50
Sungei Lembing ...	...	...	...	88·0	62·0	15·04	...	...	...	...	...	6·18	2·07

RAUB,

18th April, 1907.

W. H. FRY,

State Surgeon, Pahang.

If a planter can by testing, assure himself that he is producing a break of rubber which will pass high when similarly tested by the purchaser, he is less likely to be working in the dark when changing and improving his methods of preparation.

This apparatus was designed as a simple and accurate machine to carry out a physical test of rubber so that the planter on the estate could satisfy himself as to the resilience and elasticity of his rubber before shipping it and also in the hope that the buyer might find it useful to supplement his manual and other tests by using such a machine.

The principal of the apparatus is to submit a piece of rubber of a standard size (obtained by cutting with a sharp knife with parallel blades) to a constantly increasing strain of known amount during a constant time and temperature. In order that this machine should be of use in brokers' offices and on plantations as well as in scientific laboratories, it was made as simple as possible and quartz sand was chosen as the substance used for the weight in straining because it is less affected by temperature than mercury or water and is more easily cleaned than either of these. The sand used should pass through a No. 4 sieve, *i.e.*, having 40 meshes to the inch.

The apparatus consists of a large copper case with a water jacket at the base so that the interior can be kept at a constant temperature. The case has a glass door in front so that readings may be taken without altering the temperature.

A graduated glass cylinder containing quartz sand is so fixed that from the outside the sand may be made to flow into a receiver which is attached to the hanging piece of rubber which is to be tested. Pointers running on a finely graduated scale can be moved from outside the apparatus to determine the original length of the rubber and the extension owing to the pull by the strain of the inflowing sand.

The process is as follows:—

A piece of rubber of a given size a convenient size and shape is 15 centimetres ($5\frac{9}{10}$ inches) long by 7 centimetres ($2\frac{3}{4}$ inches) wide and 3 m.m. thick (about $\frac{1}{10}$th inch) is placed between the clamps. These clamps consist of two parallel rods one of which moves up and down and the rubber is folded over so as to clamp itself. I found that all screw clamps however accurate by the surfaces had been prepared did not hold the rubber equally and pulled slightly away at some point.

After the rubber has been in the clamps for a few minutes, the pointers are adjusted and two horizontal marks made at a distance of 5 centimetres apart on the rubber, these lines are made with a fine Indian ink point. The hanging vessel is then put on to the lower clamp. The stop-cock at the bottom of the glass cylinder is then opened and an equal and constant flow of sand passes into the receiver which is attached to the lower clamp. The time taken for the sand to run through is about five minutes, but this

can be varied with the aperture of the cylinder and the fineness of the sand. When the whole of the sand has passed into the hanging receiver, the pointers are adjusted to the marks previously made and a reading taken which according to the elasticity of the rubber being tested may be 100 per cent or more of the original measurement *viz.*, 5.0 centimetres.

The stop-cock at the bottom of the hanging receiver is then opened and the sand is allowed to flow out the strain being thus as released as gradually it was imposed.

When the vessel is empty it is removed and after two minutes the pointers are again adjusted and a third reading taken which according to the *resilience* of the rubber approximates to 5 centimetres the original length.

In a series of tests made from pieces of biscuit rubber pieces taken from different places of the same biscuit gave practically exact results, while samples of biscuits of from plantations of different age varied considerably. In these preliminary tests of the efficiency of the apparatus the results showed that the figures obtained were reliable, and though I myself or others may be able to improve or simplify the apparatus, yet as a practical curing house and office that it should be of use in arriving at a fixed method of judging the qualities of rubber either plantation or Brazilian para.

The use of this apparatus on various qualities of rubber and under varying conditions has given me useful data in relation to the physical qualities of plantation rubbers. The length of time during which extension takes place when a weight is gradually imposed, and after the weight has all been placed and the length of time for recovering back to approximately the original dimensions show interesting variations in different qualities of rubber.

It is the physical qualities of resilience and elasticity that are of value in India rubber and the chemical compositions are only of interest in so far as they are correllated with these physical properties. A physical test is therefore the most important, and this is recognised by the most careful manufacturers who test for resilience after they have manufactured *i.e.* mixed and vulcanised their rubber.

The apparatus as described was made from my drawing by Messrs. BAIRD and TATLOCK, but owing to my absence in the Far East certain improvements and modifications which occurred to me after designing the plant of the machine could not be made.

J. B. CARRUTHERS.

A PARASITIC FUNGUS ON TAPIOCA.

In March of this year, Mr. SNODGRASS brought to the office of the Botanic Gardens from Malacca a number of leaves of Tapioca,

Manihot aipi, affected with a fungus disease. The natives informed him that it was not rare especially appearing after dry weather, but owing to the long spell of dry weather we recently had it had become rather aggressive. Research showed the fungus also in Tapioca growing in damp ground in the Botanic Gardens. The leaves show at first discolored spots on both surfaces, which are of various sizes, rounded or oblong $\frac{1}{8}$ to $\frac{1}{4}$ inch across, usually when well developed the central portion is dry surrounded by an irregular yellow patch of discoloration. The whole patch eventually becomes quite dry and falls out leaving an irregular hole. Before it does so however, and when it has become brown, the fungus produces its fruits in the form of small black dots visible with an ordinary lens, chiefly on the upperside of the leaf. These small elevations produce a number of sausage shaped spores.

The fungus appears to be one of the *Uredincæ.*

At present it does not appear to have done much harm although abundant in some spots. Mr. SNODGRASS reports that the plants in affected fields produce large and good roots, but it is by no means to be neglected. The leaves affected turn yellow and fall and the plants have a sickly appearance. It is advisable to destroy as many sick leaves as possible by burning them, and to spray the plants with Bordeaux mixture.

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RUBBER CULTIVATION IN THE BRITISH EMPIRE,

BY HERBERT WRIGHT, Associate R.C.S., F.L.S.

Mr. WRIGHT is so well known to the public interested in Rubber through his work "Hevea brasiliensis or Para Rubber, its Botany, cultivation, Chemistry and diseases published last year that any further contributions from him on the same subject is bound to be read with the greatest interest. The lecture delivered before the Society of Arts by Mr. WRIGHT and of which the book under notice is the lecture amplified, is an admirable summary of our present knowledge on rubber. The criticisms on the lecture by Dr. PRAIN, and others, on the various aspects of the rubber questions are no less interesting, than valuable. Altogether we heartily commend the book and recommend any one interested in the subject to obtain it without delay. It is published by MACLAREN and SONS, at the Office of the India Rubber Journal, 37 and 38, Shoe Lane, E. C.

UNITED PLANTERS' ASSOCIATION, F. M. S.

Report for 1906.

GENTLEMEN,—Your Committee have the honour to submit for your consideration the tenth Annual Report of the United Planters' Association, F. M. S.

Meetings.

During the year four General and seven Committee Meetings were held; and in addition one conference of Delegates from all affiliated bodies.

Labour.

The question of introducing labour in sufficient numbers to develop the large areas of land in private hands and for maintaining the land already under cultivation in its highest state of productiveness continues to be the most important matter before the Planting Community. Large numbers of Indian Immigrants arrived during the early part of the year until the unfortunate outbreak of cholera in August, when recruiting received a check from which it has not yet entirely recovered.

According to figures accorded by the courtesy of the Superintendent of Immigrants the number of coolies employed on estates on 31st December 1906, was 19,354 as against 9,672 at the end of 1905, a satisfactory increase, but it is to be hoped that the figures at the end of 1907 will show a much larger increase.

From a considerable number of estates no returns have been received, so above figures are only approximate.

According to figures obtained from the same source, during 1906 12,686 coolies were imported from India into Selangor, while there were 696 deaths and 2,776 coolies absconded.

In Negri Sembilan 2,186 new coolies arrived from India, there were 245 deaths and 406 absconders.

The total employed on 31st December was divided as to 16,263 in Selangor and 3,091 in Negri Sembilan.

Competition for labour in the recruiting grounds of Southern India, is probably keener at the present time than it has ever been and it is to be hoped that every employer of labour in the Federated Malay States will help towards the common cause, by doing all in his power to make this country popular with the cooly, and, once the fact is generally known in India, that this is a country where good money is to be earned, and where individual coolies are well looked after, it is to be trusted that a constant stream of immigrants will set in, which will never stop until all our wants are satisfied.

As an instance of what the employment of labour in this country is doing for the poorer districts of India, it is interesting to record that during 1906 the sum of Rs. 2,004.555 was remitted to India

by Post Office orders alone. It is impossible to estimate the amount remitted through chetties or hoarded by coolies, and taken back to the coast in the form of jewellery and cash.

It is to be trusted that Government will realise the vital importance to the whole country of a steady flow of labour, and, by a generous policy now towards the agricultural interest, insure for the country that future prosperity that can only be obtained by steady and regular supplies of cheap labour.

Free Tickets.

The year under review was the last of the three, during which the Government of the F. M. S. originally promised this Association an annual issue of 4,600 free tickets.

These tickets have greatly attracted the flow of labor into these States, and it is only to be hoped, that the Government will not only continue this enlightened policy for the future, but even enlarge its scope.

Labour Ordinance.

The working of this Enactment has been most unsatisfactory, and in most Courts, in Selangor especially, it has been practically impossible to obtain a conviction against a cooly for absconding, and there have been numerous cases of desertion from estates.

The returns sent in answer to numerous circulars sent out by the Association are very incomplete, many estates having sent no replies at all, and it is much to be regretted that more interest is not taken in this matter.

In August, a Deputation from this Association and the Malay Peninsula Agricultural Association waited on His Excellency the Governor to discuss the working of the Labour Enactment, and your Committee are glad to report, that an Enactment has been passed, which calls upon every employer of labour to register full particulars of any labourer engaged by him with the Superintendent of Immigrants within 7 days of the date of his engagement, under heavy penalties to the employer who fails to do so and to the labourer who furnishes any false information as to the particulars regarding his previous employment.

Your Committee feel that if this Enactment is rigorously enforced, a great improvement must take place very shortly, for if there were no employers of bolters there would be few, if any, desertions.

An Immigration Committee has recently been appointed by Government, to consider the whole labour question as it affects the Federated Malay States and the Straits Settlements and to advise Government as to the best means to be taken to increase the permanent labour force of the country.

The thanks of the Association should be accorded Government for their action in so promptly realising the vital importance to the country generally of a constant and settled labour force.

Hospitals.

Your Committee regret to report that the past year has been abnormally unhealthy more especially on estates situated in the neighbourhood of Batu Tiga and some parts of Negri Sembilan.

In November 1906, certain rules in connection with the Indian Immigration Enactment 1904 were gazetted as regards the establishment of estate hospitals.

The request of your Committee that a representative Committee should be appointed to discuss the whole question before the new rules were enforced, was refused by Government and at a General Meeting of your Association, held in Seremban on 24th January 1907, it was unanimously decided to refer the whole question to the Secretary of State for the Colonies.

The action of Government in this matter in forcing on the Community a scheme, which everyone interested in is firmly convinced will prove unworkable, is much to be regretted, more especially when it is taken into consideration that planters one and all, are only too anxious to do everything that is possible to improve the health of their labour and would have loyally supported any scheme, that appeared to them to have the least chance of attaining the desired end.

Quarantine.

When Immigration had reached its height in August Cholera unfortunately broke out among coolies on their way over from the coast and subsequent cases occurred on other steamers, with the result that all available quarantine accommodation at Penang and Singapore was very quickly filled to overflowing, and for a time immigration had to be stopped.

Considerable credit is due to the Medical Authorities for having prevented the disease from spreading into the country, but your Committee feel that sufficient foresight had not been taken by Government to deal with the large numbers of coolies, who might have reasonably been expected to come into the country to develop the large area of land that had been alienated during the previous year. Your Committee were in favour of the establishment of a quarantine station or segregation camp at Port Swettenham, but this was not considered feasible by Government, and it is to be hoped that the course decided upon, namely to increase the accommodation at Penang and the building of segregation camps at the ports of embarkation in India, will be equal to the task that will be required of them. Your Committee earnestly urge on Government the importance of their having all their new buildings ready for the rush of coolies that may be anticipated later in the year.

Your Committee regret to report that Government have refused to bear any portion of the heavy expenditure thrown on the Planting Community owing to the lack of sufficient quarantine accommodation, one lot of coolies having been moved backwards and forwards between Penang, Port Swettenham and Singapore,

for a period of two months from the time they first got to Penang until they reached their destinations, during which time their quarantine charges were accumulating.

Agricultural Department.

The Department of Agriculture which should be of much use to the planting industry is slowly developing, but up to the present only one trained expert has been available *viz*: the Director, and he has to deal with all the routine of the Department as well as the important branch of such a Department's work, the giving of advice as to the treatment of disease in plants and the prevention of its occurrence. Mr. CARRUTHERS cannot be expected to deal with the whole work of the Agricultural Department and at the same time visit the many estates where his advice on these questions would be of value.

Your Committee is glad to learn that an assistant has been appointed who will devote himself chiefly to investigations of plant diseases and their prevention and cure. The addition of an Entomologist and Chemist to the Agricultural Department promised by His Excellency the High Commissioner more than a year ago has not been effected, but an Entomologist and Chemist have been appointed attached to the Institute for Medical Research and their time is partly available for agricultural investigation. In a country where insect pests are so rife and multiply so rapidly there is more than work for one Entomologist in studying the life history of diseases of cultivated plants.

Considering the monetary value of such work, the Association regrets that Government do not see their way to allow the whole time of the Entomologist to be devoted to it.

Requests for the services of the Entomologist to work at outbreaks of disease on estates have been refused as that gentleman was occupied with work of another character.

Agriculture both European and Native in these States is profitable, and is a source of large revenue to Government, and the Department which controls and helps agriculture should be properly equipped for its work, and the Association takes this opportunity of respectfully urging on Government, that the scheme under which the Department was created should be carried out and the Scientific Officials necessary should be appointed.

The Department has as far as was possible carried on useful work in the direction of experiments for the manufacture of Carbon Bisulphide to exterminate white ants, eradication of lalang by means of spraying, growing of camphor cuttings to use for catch crops, as well as by giving information and advice in answer to a large number of queries.

At the Experimental Station in Kuala Lumpur there are a considerable number of 8-year old rubber trees, and your Association looks forward to many interesting additions to knowledge in tapping and curing when the laboratories of the Department are

furnished, and when the experiments which have already been initiated have yielded results.

The Association confidently hopes that in the future this Dapartment may, when properly equipped, prove of great help in the progress of the profitable cultivation of rubber and other products.

Rubber.

The opening up of new estates has been vigorously prosecuted during the year, and the programme for 1907 is based on the maximum that can be undertaken with the available labour supply.

Our latest census returns show that there are 52, 43 *acres in cultivation in the Federated Malay States of which 49,033 are under rubber. The total area of land in private hands is 153,150 acres, and in most cases estates reserves are being planted up as quickly as circumstances permit.

The full returns as far as collected by the Association are embodied in this report.

The output for the year which amounted to 376¼ tons, is very much in excess of the estimate, and there now appears to be little doubt that the yield from cultivated rubber will be very much greater than was anticipated a short time ago.

During the year the Federated Malay States have kept well in the foreground as regards improved methods of rubber curing, and great credit is due to Mr. Pears of Lanadron Estate, a member of your Association, for having lead the way in the preparation of block rubber, which there is every indication, will prove to be the form in which all our rubber will be eventually turned out.

An uniform method of output will be of the greatest advantage to the whole of the producing interest, and it is to be hoped that it will soon be definitely known in which form the trade prefer to deal in our rubber.

Very large exports of seed have been made during the year to Java, Sumatra and other neighbouring States.

Your Committee are glad to report that no serious pest has yet made its appearance on Hevea Brasiliensis and it is to be hoped that the first appearance of any pest will be at once reported to the Agricultural Department.

Ficus elastica on some estates suffered from a very severe attack of caterpillars and there seems to be little doubt that this variety of the rubber yielding trees is less suitable to our climate than the Hevea, through being more liable to insect pests, and to its having so far yielded very disappointing results from tapping as compared with those obtained from Hevea.

Land Tenure.

This question continues to be watched with the greatest distrust by all, who are interested in the Planting Industry.

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* The Director of Agriculture's returns show 69,507 acres as planted.

Security of Property has always been the proud boast of any Administration under British Protection, and whilst we sincerely trust, that that security will always extend to free or lease-hold property in the F. M. S. and that we may not awake one fine day to see an Enactment gazetted, imposing fresh taxation on land already alienated: yet it must be admitted that the law relating to unalienated land has been of an instability well nigh intolerable.

The Land Enactment of 1891 was succeeded by that of 1892, this by another of 1893, this by another of 1897 and this once more by that of 1903; so that in the short space of 12 years we see that the basical law on the subject has been changed not less than four times.

The amount of annual quitrent charged per acre was fifteen years ago 25c., a few years later 50c., this in 1903 was raised to \$1/- and only two years after again to \$4/-.

The whole history of this legislation shows a regrettable lack of strength of purpose, not to say immaturity, which before all others unfavorably distinguishes the F. M. S. from other new countries, where, as in Canada and Australia, the capital and labor, required to develop the untapped resources of the land, are attracted by free grants of land.

The danger of over-speculation is ever present, but it has been left to the Government of the F. M. S. to set up a policy, not of counteracting such tendencies, but of carefully fostering them by restricting grants of land and by raising their original price. For, the consequence of this attitude can only mean one thing, namely to induce every individual owner of land to try to sell out his interest to investors in Europe, while prospects are so promising and values so high.

Comparisons are odious, but one cannot help comparing the land rules of these States with those of our next door neighbours, Sumatra. In Sumatra an agricultural industry has been established for years, paying as much as 150 per cent annual dividends in several cases; but far from trying to restrict the cultivated area, the Dutch Government have ever been most liberal in offering the virgin stretches of land suitable for tobacco-cultivation to whomsoever was willing to develop the dormant wealth of the Colony. That this policy pays best in the end must be obvious; for even if the direct income from land sales and land taxes is less in this case, the general and indirect revenue obtained through the creation of a large and thriving industry, employing thousands of laborers, must in the end cover a hundredfold the original loss of revenue.

If then the framing of our present Land Rules, as affecting the Rubber Industry cannot be called anything but the absolute opposite of statesmanlike: what can be said about these Rules, as applied to the other Agricultural Industries?? If the same \$4/- quitrent a year has to be paid per acre, whether the crop be rubber or coconuts, whether the yield per acre be £40 or £4: the only natural result can be to drive everybody to plant up every acre of

his land with that product, which promises the highest absolute profits. We therefore find again, that the Government, instead of doing all in their power to attract capital to agricultural industries other than rubber and thus ensuring as far as possible stability of the future of Agriculture in these States: we find a policy, which places a premium on the folly of putting all the country's "eggs into one basket." So incredible does this folly seem, that your Committee for a long time believed that these Rules had only by inadvertence been made to apply to products other than rubber; and it was only after prolonged correspondence that we realized that the present Regulations were framed with the distinct intention to cover the cultivation of any agricultural product, from sweet potatoes to gutta percha.

This decision on the part of Government is all the more deplorable, as it has actually stopped several cases, where Rubber Estates intended to plant up part of their area with coconuts as a reserve, which although promising perhaps more moderate returns, yet lacks the speculative nature of rubber cultivation.

Having been unable to obtain any redress regarding the charges made for land, whether intended for the cultivation of rubber or coconuts: your Committee at least endeavored to obtain definite information, on exactly what terms and within what time applications for land would be entertained. But even on this point, we have only been able to elicit a repetition of vague generalities, which seem to indicate that Government wishes to continue the practice of the past, in keeping an applicant waiting for months and months and only after endless correspondence promising him a title at some indefinite future time to perhaps only half the area originally applied for.

It seems obvious from all that has been said, that the present attitude of the Government is untenable, and this Association should therefore not relax its efforts to bring about a change of policy on the following lines:

1. Increase in the number of Surveyors (by an offer of better pay) and consequent quick issue of titles to all land alienated.

2. Unrestricted issue of land to all applicants without distinction, conterbalanced by a summary application of stringent cultivation clauses.

3. Reduction of all quitrents to a nominal sum and abolition of premiums.

4. Taxation by result only; *i.e.* export duty, calculated on a sliding scale according to the Market Rates of the day; similar to the one, on which 9/10ths of the actual Revenue of the States depends, *viz.* of Tin; and equally similar to the one on which duty was levied on what until quite recently was the principal agricultural produce, *viz.* Coffee.

The Customs.

Your Committee are able to record with pleasure a great improvement that has been introduced by the Government at the

instigation of this Association in the method of calculating the export duty leviable on rubber. In the past the $2\frac{1}{2}$ per cent. ad valorem duty was calculated in Selangor on one fictitious value, fixed arbitrarily and gazetted from time to time. This value applied to all grades of rubber indiscriminately and was fixed at $300 per pikul for the greater part of the year.

The new Rules however, provide that in future duty is payable on the actual value of rubber, which is fixed fortnightly in accordance with the average prices realized during the preceding two weeks in Singapore. This is distinctly a step in the right direction, and, we trust, will ultimately lead to the establishment of that Sliding Scale, which we again and again have advocated and which alone will provide a means of raising revenue, which is easy of application, fair in its incidence and rational in its conception.

As from the 1st of January 1907, a new Federal Department was created, *viz.* that of Trade and Customs, which it is hoped will further tend to a unification of Customs Dues in the four States of the Federation and to a more vigorous prevention of smuggling. For, the impunity with which it has been possible for unscrupulous receivers to send stolen rubber out of the country, has no doubt in a great measure contributed to the extensive thefts of cured rubber, that have lately taken place, more particularly in the Klang District.

Your Committee have suggested to Government to introduce a license, without which no person is to be permitted to deal in or export cultivated rubber; such licensed exporters to be obliged to keep separate books of account, clearly setting forth the origin of any rubber passing through their hands; and we have further recommended that all cases, only described in a general way, such as "Sundries", be opened for inspection before being allowed to pass the Customs Department.

A useful departure which, we understand, is contemplated by the Federal Department for Trade and Customs, is the monthly publication of the quantities of rubber exported, in a similar manner to that in which the Mines Department have in the past supplied the public with analogous information regarding the output of tin.

Praedial Produce Protection.

An Enactment extending to the rubber plant and its products the protection previously given to other agricultural produce, has at last been gazetted. The first move in this matter was made by this Association nearly two years ago, and, although late in arriving, this legislation can only be welcomed with the greatest satisfaction by all interested in the Rubber Industry.

Depredations have been on the increase of late and especially as regards seedlings and stumps a thriving business has been carried on in, what in many cases obviously were, plants stolen from Estate Nurseries.

Losses of cured rubber have already been dealt with in the preceding paragraph and it is to be hoped that the gazetting of this Enactment, and the introduction of additional legislation providing for the Licensing of Rubber Exporters, together with increased vigilance on the part of the Police: will effectively put a stop to what is becoming a serious menace to all Rubber Planters.

Exhibitions.

Very successful Exhibitions during the year were held at Singapore and at Peradeniya, at both of which the Members of this Association were well represented. The Ceylon Show in particular was of such great importance that this Association sent special Delegates over to attend the Exhibition. The results of this visit are contained in the useful and interesting Report written by Mr. ZACHARIAS, which has since been printed and circulated amongst all Members of this Association.

So great indeed was the success of this latter Exhibition, that your Committee hope that it will be merely the first of a series of International Rubber Exhibitions, the second of which we are now trying to arrange for, and which it is suggested should be held in Kuala Lumpur during the second half of 1909.

Library.

The desire to render this Library yet more useful as a centre of reference and information, has induced your Committee to subscribe to all the publications issued by the Royal Botanic Gardens, Peradeniya. Mr. W. MEIKLE kindly presented a copy of Weber's Chemistry of Rubber and a regular exchange of reports has been established between this Association and the Planters Association of Ceylon and the United Planters' Association of Southern India. It is now only to be hoped, that Members will increasingly make use of this Institution, so as to justify your Committee in incurring further expenditure under this head.

District Associations.

During the year several District Associations have been formed in Selangor, Negri Sembilan, and Perak, and at a General Meeting of this Association held at Seremban on 24th January 1907, it was decided to reconstitute this Association, so as to include all Planting bodies in the Straits Settlements, Federated Malay States, and Johore, thus making it the Executive of the whole of the planting interests of the Malay Peninsula.

General.

During the year 27 Estates have joined the Association: the total number of Members to date being 111 out of which there are—

in Selangor	...	...	77
,, Negri Sembilan	...	...	18
,, Perak	...	...	13
,, Pahang	...	...	3

For the Committee:

R. W. HARRISON,

Chairman.

U. P. A.

CENSUS RETURNS.

1st JANUARY, 1907.

All figures are Acres, unless otherwise stated. Replies were received from 69 Estates in Selangor, 13 in Negri Sembilan, 12 in Perak and 3 in Pahang.

—	Rubber.	Coffee.	Coconuts.	Other Products.	Total Cultivated.	Total Uncultivated.	Grand Total.
Selangor ...	37,712¾	2,057	966½	79	40,815¼	75,480½	116,295¾
Negri Sembilan ...	8,345	...	43	27	8,415	13,850½	22,265½
Perak ...	4,397¾	...	1,385¼	52	5,835	11,591	17,426
Pahang ...	163	...	...	...	163	2,309	2,472
Total ...	50,618½	2,057	2,394¾	158	55,228¼	103,231	158,459¼

—	PARA. Under 1 year.	Under 2 years.	Under 3 years.	Under 4 years.	Under 5 years.	5 Years & over.	FICUS. Under 1 year.	Under 2 years.	Under 3 years.	Under 4 years.	Under 5 years.	5 Years & over.	Total.
Selangor ...	16,106	5,783¼	2,968½	2,705½	1,222½	8,089¾	174¾	48	57	33	89	229	37,506¼
Negri Sembilan ...	3,172	1,284	1,283½	722	335	1,381	...	...	49½	...	...	...	8,227
Perak ...	2,281	947	850	94	61	471	...	...	10	15	3¾	...	4,732¾
Pahang ...	163	...	...	...	...	...	...	...	...	...	...	...	163
Total ...	21,722	8,014¼	5,102	3,521½	1,618½	9,941¾	174¾	48	116½	48	92¾	229	50,629

CROP RETURNS.

—	1906 (ACTUAL.) Rubber.	1906 (ACTUAL.) Coffee.	1906 (ACTUAL.) Coconuts.	1907 (ESTIMATED.) Rubber.	1907 (ESTIMATED.) Coffee.	1907 (ESTIMATED.) Coconuts.
	Cwts.	*Pks.*	*Nuts.*	*Cwts.*	*Pks.*	*Nuts.*
Selangor ...	5,674½	18,529	515,362	9,156	16,940	671,000
Negri Sembilan ...	1,594	1,919	480	2,398	1,800	500
Perak ...	257	878	314,601	717	873	452,000
Pahang ...	...	...	...	...	...	...
Total ...	7,525½	21,326	830,443	12,271	19,613	1,123,500

U. P. A.

Balance Sheet for Financial Year closing 31st March, 1907.

LIABILITIES.	$	c.	$	c.
SUNDRY CREDITORS :—				
Barlow & Co.	2,733	71		
Chow Kit & Co.	4	59		
Malay Mail Press Co.	2	00		
Malayan Supply Co.	124	50		
Dir. Bot. Gardens	90	00		
			2,954	80
QUARANTINE A/C	...	...	54	49
P. & L. A/C :—				
Last year's Balance — ...	564	85		
Burgess Fund	224	05		
This year's Profit	2,578	92		
			3,367	82
TOTAL ...	...	...	6,377	11

ASSETS.	$	c.	$	c.
CASH :—				
At Bank	2,390	85		
In Safe	580	34		
			2,971	19
SUNDRY DEBTORS :—				
Members	2,890	32		
Others	514	60		
			3,404	92
LIBRARY	...	...	1	00
TOTAL ...	...	...	6,377	11

Dr. **Working Account.** **Cr.**

	$	c.
To Postages	112	13
,, Library	122	66
,, Charges	121	03
,, Secretary	2,400	00
,, Stationery	483	17
,, Exhibitions	567	96
,, Blce. cd. ford.	2,578	92
TOTAL ...	6,385	87

	$	c.
By Subscriptions	5,710	87
,, Registration Fees	675	00
TOTAL ...	6,385	87

(Sd.) H. C. E. ZACHARIAS,
Secretary.

Having examined the books of the United Planters' Association I hereby certify that the foregoing Balance Sheet and Working Account exhibit respectively a true and correct statement of the Association's affairs at 31st March 1907, and the result of the year's intromissions on revenue, as shown by the books.

(Sd.) R. M. NEILL,
Chartered Accountant.

KUALA LUMPUR, *23rd April*, 1907.

GOW, WILSON & STANTON, LIMITED— India Rubber Market Report.

13, ROOD LANE, LONDON, E.C.
April 12th, 1907.

At to-day's auction, 557 packages of Ceylon and Malaya Plantation grown rubber were under offer, of which about 240 were sold. The total weight amounted to over 26 tons, Ceylon contributing about $9\frac{3}{4}$, and Malaya nearly $16\frac{1}{3}$ tons.

In sympathy with the Para market, the auction was characterised by rather slow competition, and prices generally marked a slight decline on last sale rates. Where bidding was under Merchants' ideas, the offerings were generally withdrawn for private treaty, and in these cases, as a rule, more money was forthcoming after the auction. None of the finest quality of Crepe changed hands.

Another exceptionally fine lot of Rangbodde Ceara biscuits was well competed for and realised the highest price in the room, *viz.*, $5/10\frac{1}{2}$ per lb.

Scrap was a little irregular during the sale, but afterwards there was a better demand for this grade privately.

QUOTATIONS:—Good to Fine block, 5/8.
Fine sheet, 5/7 to $5/7\frac{1}{2}$.
Fine biscuits, 5/7 to $5/7\frac{3}{4}$.
Very fine Ceara Biscuits, $5/10\frac{1}{2}$.

Crepe:
- Very fine pale, none sold.
- Palish to darkish, $5/3\frac{1}{4}$ to $5/7\frac{1}{2}$.
- Dark, pressed, and block, $5/0\frac{1}{4}$ to $5/4\frac{1}{4}$.

Scrap:
- Fine, 4/6 to $4/6\frac{3}{4}$.
- Fair to medium, 4/1 to $4/4\frac{1}{2}$.

PLANTATION FINE TO-DAY.—5/7 to $5/10\frac{1}{2}$, same period last year, $6/2\frac{3}{4}$ to $6/3\frac{1}{4}$.

DO. SCRAP, 4/1 to $4/6\frac{3}{4}$, same period last year, 4/5 to 5/5.

FINE HARD PARA (South American).—4/11, same period last year, $5/5\frac{7}{8}$.

AVERAGE PRICE OF CEYLON AND MALAYA PLANTATION RUBBER.

Two hundred and forty packages at $5/4\frac{1}{4}$ per lb., against 100 packages at 5/11 per lb. same period last year.

Particulars and prices as follows:—

Ceylon.

MARK.	QUANTITY, DESCRIPTION AND PRICE PER LB.
Halgolle	7 cases good dark biscuits, bought in. 3 cases fine palish scrap, bought in. 2 cases good dark, bought in.
Katugastota	1 case fine palish biscuits, bought in. 1 case good scrap, bought in.
New Rasagalla	2 cases fine palish scrap, bought in. 2 cases darker, bought in.
Galatura	2 cases good dark biscuits, bought in.
Hapugastenne	2 cases good darkish biscuits, bought in. 1 case darkish scrap, $4/4\frac{1}{2}$.

Mark.	Quantity, Description and Price per lb.
Madampe	2 cases fine palish biscuits, bought in. 1 case good dark, bought in. 1 case good scrap, bought in.
Wavena	1 case fine dark and light block, bought in. 1 bag good dark block, bought in.
Craighead	1 case fine pale biscuits, bought in.
D | M / O | G	1 case good palish biscuits, bought in. 1 bag good scrap, bought in.
Rangalla	1 case good palish to darkish biscuits, 5/7¼. 1 bag rejections, bought in.
C L	1 case good palish to darkish crepe, bought in. 7 cases good darkish rolled crepe, bought in. 9 cases good palish to darkish pressed crepe, bought in. 8 cases palish and brownish crepe, bought in. 4 cases good darkish, bought in. 5 cases good darkish and black pressed, bought in. 4 cases good palish block, bought in. 1 case fine palish scrap, bought in. 2 cases darker, bought in. 10 cases darkish earthy scrap, bought in. 8 cases dark, bought in. 4 cases barky, bought in. 1 case lump scrap, bought in. 1 case rejections, bought in. 2 cases good scrap, bought in. 2 cases low heated, bought in. 1 case fine dark worm, bought in. 1 case fine palish, bought in. 1 case cuttings, bought in. 2 cases rejected biscuits, bought in.
Kipitigalla	27 cases good darkish sheet, bought in. 1 case good large biscuits, bought in. 1 case palish wet block, bought in.
Culloden	11 cases fine pale crepe, bought in. 1 case fine palish, 5/4¾. 10 cases fine pale and palish, bought in. 13 cases good palish, 5/5. 1 case fine pale and dark block, 5/8.
J J V & Co.	1 case low scrap, bought in. 1 case pressed scrap, bought in. 1 case rejections, bought in. 1 case barky scrap, bought in. 1 case rejections, bought in. 1 case biscuits, scrap and rejections, bought in. 1 case good wound scrap, bought in. 2 cases good pressed scrap, bought in.
Tallagalla	3 cases fine dark biscuits, 5/7 to 5/7¼. 2 cases good pressed scrap, 4/4¾.
Warriapolla	3 cases very fine pale biscuits, 5/7¾. 2 cases darker, 5/7¾. 1 case good dark, 5/7¼.
Sunnycroft	1 case good rough biscuits, 5/7. 1 case barky scrap, 4/3¾.
D B M	1 bag scrap, bought in. 2 cases dark scrap, bought in.
Rangbodde	1 bag very fine pale Ceara biscuits, 5/10½.
Waharaka	1 case good rough biscuits, 5/7. 2 cases dark scrap, 4/4¼.
Ambanpitiya	1 box good palish to darkish biscuits, 5/7. 1 box lump scrap, 4/4.
Ayr	1 case good darkish biscuits and sheet, 5/7. 1 case good pressed scrap, 4/4½.
Ambatenne	3 cases fine palish biscuits, 5/7½. 2 cases darker, 5/7¼. 1 case fine amber sheet, 5/7½. 1 case fine scrap, 4/6¼. 3 cases and 1 bag good dark scrap and rejections, part sold 4/4¾ to 5/3.
V S / KM	2 cases and 2 bags biscuits, scrap and rejections, bought in.
Densworth	2 cases fine palish to darkish biscuits, 5/7. 1 case fine scrap, 4/5. 2 bags scrap, bought in.
B B & Co.	1 case fine palish crepe, bought in. 1 bag good darkish, bought in.
Polatagamaa	6 cases good rough biscuits, 5/7. 1 case cuttings, 4/7¼. 1 case scrap and cuttings, 4/6.

Mark.	Quantity, Description and Price per lb
Weoya	1 case scrap and cuttings, 4/6.
Halwatura	3 cases good dull biscuits, 5/7¼.
Nilambe	1 case good palish to darkish biscuits, 5/7. 1 case good pressed worm, bought in. 1 case good pressed scrap, 4/5¾.

Malaya.

Mark.	Quantity, Description and Price per lb.
C M R E Ld.	4 cases fine palish to darkish crepe, bought in. 14 cases good dark, bought in.
Sungei Krudda	4 cases good sheet, bought in. 3 cases low scrap, bought in. 7 cases dark scrap, bought in. 1 case earthy scrap, bought in. 1 bag rejected sheet, bought in. 20 cases fine amber sheet, bought in. 2 cases rejected sheet, bought in. 4 cases low scrap, bought in. 1 case earthy scrap, bought in.
Linggi Plantations	8 cases good darkish block, bought in.
L E B C	6 cases darkish crepe, bought in. 1 case good palish to darkish crepe, bought in. 3 cases good brownish, bought in. 3 cases darkish pressed, bought in.
T E B C	7 cases palish and darkish crepe, bought in.
Pataling	9 cases palish and brownish crepe, bought in. 3 cases brownish and black, 4/11¾.
V R Co Ld. Klang FMS	17 cases fine pale and palish crepe, bought in. 3 cases good palish to darkish, 5/4. 8 cases good dark smoked block, 5/4¼. 6 cases good darkish block, bought in. 16 cases fine pale and palish crepe, 5/7½. 4 cases good palish 5/4¼. 7 cases fine dark smoked block, 5/4¼. 3 cases good palish block, bought in.
S R Co.	24 cases fine washed sheet, 5/7½. 9 cases fine palish to darkish crepe, 5/3¾. 7 cases good darkish, 5/1 to 5/1¼. 4 cases good dark, 5/1.
E B & Co.	3 cases good sheet, 5/7¼. 1 case rejected sheet, 5/7. 1 case good dark sheet, 5/7. 1 bag scrap and pieces, 4/1.
R R S	4 cases fine amber sheet, 5/7½. 2 cases good scrap, 4/4. 1 case rejections, 4/3½. 9 cases fine amber sheet, 5/7¼ to 5/7½. 1 case rejections, 5/3½. 1 case scrap, 4/3½. 2 cases lace scrap, 4/3½.
KM	2 cases fine amber sheet, 5/7¼. 1 case rejected sheet, 5/6.
Yam Seng	11 cases fine amber sheet, 5/7½. 7 cases dark scrap, 4/4. 3 cases rejections, 4/3½.
B M & Co. P	8 cases fine amber sheet, 5/7¼ to 5/7½. 4 cases good scrap, 4/4½. 3 cases lump scrap, 4/3½. 2 cases rejections (part uncured), 4/5.
SP S	1 case good wound scrap, bought in. 2 cases good rejections from biscuits, bought in. 2 cases dark heated scrap, bought in. 1 case earthy scrap, bought in.
EP	1 bag good biscuits, 5/7. 1 bag small rejected biscuits, 5/1. 1 bag lump scrap, bought in. 1 case good darkish, 4/2¼. 2 cases good pressed, bought in.
G K K B	2 cases very fine amber sheet, 5/7¼.

Mark.	Quantity, Description and Price per lb.
SSBRCoLd	8 cases fine amber sheet, 5/7½. 1 case fine pale scrap, 4/6¾. 1 case good dark, 4/5¾. 6 cases fine amber sheet, 5/7½. 1 case very fine scrap, 4/6¾. 1 case good rejections, 4/6.
Kepong	3 cases pressed undried crepe, 4/4.
Jebong	3 cases good dark crepe, bought in.

GOW, WILSON & STANTON, LIMITED—

India Rubber Market Report.

13, Rood Lane, London, E. C.

April 26th, 1907.

At to-day's auction, 862 packages of Ceylon and Malaya Plantation grown rubber were under offer, of which about 379 were sold. The total weight amounted to over 46¼ tons, Ceylon contributing about 11½, and Malaya over 34¾ tons.

The largest quantity of Plantation Rubber yet offered was brought forward at to-day's Auction. Competition was somewhat restricted, buyers' ideas being frequently below sellers' limits, resulting in unusually heavy withdrawals. Prices generally marked a decline of over 1*d*. per lb. on rates current at last sale.

A fine parcel of block from the Lanadron Estates brought the highest price, namely, 5/10½ to 5/11 per lb.

Quotations.—Fine block, 5/10½ to 5/11.
Good block, 5/-.
Fine sheet, 5/6 to 5/6¾.
Fine biscuits, 5/5½ to 5/6½.

Crepe { Very fine pale, 5/7½.
Palish to darkish, 5/2 to 5/4½.
Dark, pressed, and block, 4/10 to 5/1¼.

Scrap { Fine, 4/4¼ to 4/5.
Fair to medium, 3/11¾ to 4/3¾.

Plantation Fine To-day.—5/7½ to 5/11, same period last year, 6/2¾ to 6/3.

Plantation Scrap.—3/11¾ to 4/5, same period last year, 4/- to 5/3½.

Fine Hard Para (South American).—4/10½, same period last year, 5/4½.

AVERAGE PRICE OF CEYLON AND MALAYA PLANTATION RUBBER.

Three hundred and seventy-nine packages at 5/4½ per lb., against 227 packages at 5/11¼ per lb., same period last year. Particulars

Ceylon.

Mark.	Quantity, Description and Price per lb.
and prices as follows :—	
Wavena	14 cases fine amber sheet, bought in. 4 cases darker, bought in. 1 case good dull, bought in. 1 case fine palish biscuits, bought in. 1 case good scrap, 4/3¼. 1 case good palish and dark block, bought in. 1 bag dark, bought in.
Culloden	4 cases brownish pressed crepe, 5/1¼. 3 cases darkish pressed crepe, 5/2.
Ellakande	1 case very fine palish scrap, 4/5.
Nikakatua	10 cases dark pressed crepe, bought in.
Langlands	10 cases good dull biscuits, 5/6¼. 1 case scrap and rejections, 4/2¼. 1 case fine pale and palish biscuits, 5/6.
Witheragama	3 cases fine amber sheet, 5/6. 1 bag good dull biscuits, 5/3. 1 case spun-ball scrap, 3/8½. 1 bag rejections, 3/8½.
Gikiyanakande	6 cases very fine pale worm, bought in. 2 cases fine brownish rolled crepe, bought in. 2 cases dark, bought in. 1 case black, bought in.
CY	3 cases fine palish to darkish biscuits, 5/6.
CL	9 cases dark pressed crepe, bought in. 1 case good pale scrap, bought in. 12 cases good darkish, bought in. 8 cases dark, bought in. 2 cases black heated, bought in. 1 case good dark cuttings, bought in. 1 case palish cuttings and worm, bought in. 1 case good rejections, bought in. 1 case rejected biscuits, bought in. 5 cases good darkish and dark crepe, bought in. 17 cases good brown, bought in. 4 cases good pressed scrap, 4/3¼. 8 cases good dark pressed scrap, 4/3½. 3 cases earthy ball scrap, bought in. 1 case heated, bought in. 1 case dark barky scrap, bought in. 1 case rejections, bought in.
Kipitigalla	1 case good large biscuits, bought in. 34 cases fine amber sheet, bought in. 1 case darker, bought in. 3 cases lump scrap, bought in. 3 cases good dark scrap, bought in. 1 case pressed barky scrap, bought in. 1 case fine palish block, 5/-.
Suduganga	2 cases good biscuits, bought in. 2 cases rough biscuits, bought in. 1 case dull biscuits, bought in.
Yatipawa	7 cases good scrap, 4/3¾.
M	6 cases fine amber sheet, bought in. 1 bag black crepe, bought in. 1 bag wound scrap, bought in.
Dangan	4 cases fine darkish biscuits, bought in. 1 case fine palish to darkish biscuits and sheet, bought in. 1 case good pressed scrap, 4/2¾. 1 case rejections, 4/2¾.
Duckwari	1 case very fine pale biscuits, bought in. 1 bag good scrap, bought in. 1 bag very fine pale biscuits, bought in. 1 bag fine thick biscuits and block, bought in. 1 bag good block (part uncured), bought in.
Kumbukkan	2 cases fine palish to darkish biscuits, bought in.
Sorana	4 cases very fine pale and palish biscuits, 5/6½. 2 cases darker, 5/6¼.
Rangbodde	1 case very fine pale Ceara biscuits, bought in.
Dolahena	1 case low scrap, bought in. 1 bag rejections, bought in.
M A C	1 case scrap, bought in.
Taldua	1 case good dark biscuits, 5/5¾. 1 case dark scrap, 3/11¾.
Waharaka	2 cases earthy scrap, 4/3¼.
Clara	1 case good thick darkish biscuits, 5/3. 1 case pressed scrap, 4/3.

Mark.	Quantity, Description and Price per lb.
Doranakande	3 cases good dull biscuits, 5/5½. 1 case rejected biscuits and sheet, 4/9. 1 case good pressed scrap, 4/3¼. 1 case dark 4/1¾. 2 cases rejections, 4/2.
Ballacadua	4 cases dark pressed crepe, bought in.

Malaya.

Mark.	Quantity, Description and Price per lb.
C M R E Ltd.	13 cases fine pale and palish crepe, bought in. 9 cases fine palish and darkish, bought in. 5 cases good dark, bought in.
Highlands	26 cases fine washed sheet, 5/6½ to 5/6¾. 4 cases good darkish crepe, 5/3½. 6 cases darkish and brownish, 5/2. 10 cases fine washed sheet, 5/6½. 5 cases fine palish and darkish crepe, 5/3½. 3 cases good darkish, 5/2. 1 case good dark, bought in. 7 cases good brown, bought in. 21 cases good darkish washed sheet, 5/6½. 18 cases fine palish to darkish crepe, 5/1¼ to 5/3½. 6 cases good dark, 4/11¼. 6 cases darkish and brown, bought in.
V R Co Ld. Klang FMS	1 case very fine pale crepe, 5/7½. 34 cases fine palish, bought in. 7 cases fine palish to darkish, 5/2¾.
S R Co.	18 cases fine washed sheet, 5/6¼. 5 cases good darkish crepe, 5/2¾. 12 cases good dark, 4/11. 8 cases dark and black, 4/10.
K P Co. Ld.	9 cases fine amber sheet, 5/6¼. 2 cases good lace, 4/5. 6 cases barky scrap, 4/2¼. 3 cases good dark sheet, 5/5½. 1 case good lace, 4/5. 2 cases fine scrap, 4/4¼.
P S E	8 cases very fine amber sheet, 5/6¼. 1 case dark pressed crepe, bought in.
Yam Seng	11 cases fine amber sheet, 5/6¼. 7 cases good dark scrap, 4/2½. 3 cases rejections, 4/1½.
K	5 cases fine washed sheet, 5/6. 1 case dark scrap crepe, 4/8½. 1 case scrappy sheet, 4/2¼.
Matang	6 cases fine amber sheet, 5/6. 2 cases dark scrap, 4/1¾. 1 bag lace, 4/5. 1 case rejections, 3/9¾. 1 bag rejected sheet, 4/1¼. 1 bag rough sheet, 4/1¼.
J J V & Co.	8 cases good palish block, bought in. 1 case rejections, bought in. 2 cases earthy scrap, bought in. 1 case heated lump scrap, bought in. 2 cases good block scrap, bought in. 1 case barky block scrap, bought in. 1 case rejections, bought in. 1 case barky scrap and cuttings, bought in. 1 case good rejections, bought in. 1 case biscuit, scrap and rejections, bought in. 1 case wound scrap, bought in. 2 cases blocked scrap, bought in.
K M B	5 cases fine palish block, bought in. 3 cases good palish, bought in. 1 case dark, bought in.
L E A C	11 cases fine pale to palish crepe, bought in. 4 cases pale and darkish crepe, bought in.
L E B C	3 cases fine darkish crepe, bought in. 6 cases good darkish crepe, bought in. 1 case good palish to darkish crepe, bought in. 3 cases good brown, bought in.
T E A C	1 case good darkish crepe, bought in. 4 cases fine pale and greyish crepe, bought in. 4 cases good palish and darkish bought in. 1 case good darkish, bought in.
Pataling	18 cases fine palish crepe, bought in. 9 cases good dark, bought in.
T E B C	1 case good pale and palish crepe, bought in. 2 cases good darkish, bought in.

Mark.	Quantity, Description and Price per lb.
T E C C	1 case good dark crepe, bought in. 1 case black, bought in.
T E A B	1 case good palish block, bought in.
T E C B	1 case dark block, bought in.
L E C B	3 cases dark pressed crepe, bought in.
C R RW C	1 bag earthy scrap, 2/4$\frac{1}{2}$.
B R R Co. Ld.	30 cases fine amber sheet, bought in. 41 cases darker, bought in. 4 cases fine palish crepe, bought in. 5 cases good palish, bought in. 4 cases good palish and darkish, 5/3$\frac{1}{2}$. 7 cases good darkish, 5/2$\frac{3}{4}$. 7 cases darker, bought in. 4 cases good dark, bought in.
Z B	1 case darkish block, bought in. 1 bag very fine pale pressed sheet, bought in. 1 bag scrappy sheet, bought in.
L E Muar Straits	45 cases very fine block, 5/10$\frac{1}{2}$ to 5/11. 9 cases good darkish crepe, 5/2$\frac{3}{4}$ to 5/3.
B M & C	3 cases fine amber sheet, 5/6. 5 cases good dull biscuits, bought in. 4 cases palish and darkish heated crepe, bought in.
B & D	1 bag very fine pale sheet, 5/6. 1 case good biscuits and sheet, 5/3. 1 case blocked scrap, 3/9$\frac{1}{4}$. 1 case good palish biscuits, 5/6$\frac{1}{4}$. 1 case good dull biscuits, 5/5$\frac{1}{2}$. 1 case rejections, 4/4$\frac{1}{2}$.
Damansara	10 cases good blocked crepe, 5/4$\frac{1}{2}$. 4 cases palish to dark, bought in. 2 cases good dark, 4/3 to 4/6. 1 bag good palish to dark, bought in.
SP	2 cases good blocked scrap, bought in.
	1 case wound scrap, bought in. 2 cases good rejections, bought in.

GOW, WILSON & STANTON, LIMITED—
India Rubber Market Report.

13, Rood Lane, London, E. C.

May 10*th*, 1907.

At to-day's auction, 357 packages of Ceylon and Malaya Plantation grown rubber were under offer, of which about 158 were sold. The total weight amounted to over 18 tons, Ceylon contributing over 5, and Malaya about 13 tons.

On the whole the quality of the offerings was a little disappointing. There was fair competition for the better descriptions on the basis of last sales rates, and in a few cases slight advances were recorded for some good lots.

The highest price, *viz.*, 5/8¼ per lb. was realised for some fine pale crepe.

Scrap and the lower grades of crepe were inclined to be somewhat neglected.

A good proportion of the sale was withdrawn for private treaty, owing to lack of bidding.

QUOTATIONS.—Fine sheet, 5/6 to 5/7.
Fine biscuits, 5/6½ to 5/7¾.
Crepe { Very fine pale, 5/7 to 5/8¼.
Palish to darkish, 5/3 to 5/6.
Scrap { Fine, 4/5¼.
Fair to medium, 3/9 to 4/3½.
Low, 2/10½

PLANTATION FINE TO-DAY.—5/6 to 5/8¼, same period last year, 6/- to 6/2¼.

Do. SCRAP.—3/9 to 4/5¼, same period last year, 4/- to 5/3½.

FINE HARD PARA (South American).—4/9½, same period last year, 5/3½.

AVERAGE PRICE OF CEYLON AND MALAYA PLANTATION RUBBER.

158 packages at 5/4½ per lb., against 227 packages at 5/11¼ per lb. same period last year.

Particulars and prices as follows:—

Ceylon.

MARK.	QUANTITY, DESCRIPTION AND PRICE PER LB.
Aberdeen	5 cases fine darkish biscuits, 5/7½ to 5/7¾. 1 case good scrap, 4/2½. 1 bag wound scrap, 3/1. 1 case rejections, 3/1.
Welkandala	2 cases good darkish crepe, 4 10½. 2 cases good dark biscuits, 5/5¾.
Veralupitiya	1 case fine pale amber sheet, 5/7. 1 bag fine scrap, 4/3½.
Rangalla	1 bag rejections, 3/6½.
C B	4 cases fine dark biscuits, bought in.
V K B	1 case slabs, bought in.
Northumberland	1 case good dull biscuits, 5/6¾.
Densworth	1 case fine palish to darkish biscuits, 5/7.
Waharakà	1 case good dark biscuits, 5/6½.
Doranakande	2 cases good darkish biscuits, 5 6½. 1 case good pressed scrap, 4/3¼. 2 cases rejections, 4/-.

Mark.	Quantity, Description and Price per lb.
R	4 cases fine pale crepe, 5/8¼. 4 cases fine palish, bought in.
B B & Co.	1 case fine palish crepe, bought in. 1 bag good darkish, bought in.
D B M	2 cases heated Rambong scrap, 2/10½.
Heatherley	1 case earthy scrap, bought in.
Culloden	1 case earthy scrap, bought in.
Tudugalla	3 cases low scrap, bought in.
PES	2 cases low scrap, bought in.
Siragalla	1 case good biscuits, 5/6¾. 1 case fine scrap and lumps, 4/2 to 4/4¼.
CL	16 cases good darkish crepe, bought in. 6 cases dark smoked block, bought in. 2 cases dark pressed crepe, bought in. 1 case darker, bought in.
Kipitigalla	1 case rejected biscuits, bought in. 2 cases cuttings, bought in. 3 cases dark scrap, bought in. 11 cases fine palish to dark sheet, bought in. 9 cases good dark, bought in.
Old Haloya	1 case fine biscuits, 5/7.
R M P LTD	2 cases scrappy sheet, bought in.
Kumaradola	1 case dark pressed scrap, bought in. 2 cases fine palish biscuits, 5/7¾.
Nikakotua	3 cases dark pressed crepe, bought in.
J J V & Co.	8 cases good palish to darkish block, bought in.
	Malaya.
Sungei Krudda	3 cases scrappy sheet, 3/6½ to 4/6. 1 case earthy scrap, 3/9.
Linggi Plants, Ld.	8 cases good dark block, bought in. 7 cases fine pale crepe, 5/8¼. 5 cases fine palish, bought in. 4 cases good palish to darkish, 5/3. 1 case fine palish pressed crepe, bought in. 1 case darkish, bought in. 4 cases brown, bought in.
Matang	9 cases fine amber sheet, 5/6½. 2 cases good darkish scrap, 4/3½. 1 case darker, 4/-. 1 case lace, 4/5. 1 bag rejections, 4/-. 1 bag rejected sheet, 4/3.
SP	2 cases good pressed crepe, bought in.
SP S	1 case wound scrap, bought in. 2 cases thick rejections, bought in.
F J R	3 cases good pressed Rambong, bought in.
T E B B	1 case greyish pressed crepe, bought in.
A M R C	3 cases fine palish crepe, 5/5. 6 cases good darkish crepe, bought in. 7 cases fine amber sheet, 5/6½.
Pataling	6 cases fine palish to darkish crepe, bought in. 1 case fine palish and brownish, bought in. 1 case good brownish and dark, bought in.

MARK.	QUANTITY, DESCRIPTION AND PRICE PER LB.
B N S K L	4 cases fine amber sheet, 5/6½.
Do. K S L	1 case good scrap, 4/3¼. 2 cases low earthy scrap, bought in.
L E B C	4 cases good palish to darkish crepe, bought in.
Jebong	15 cases fine pale crepe, 5/7.
S S B R Co. Ltd.	8 cases fine amber sheet, 5/6½. 1 case dark pressed crepe, 4/10½. 1 case thick rejections, bought in. 2 cases fine scrap, 4/5¼. 1 bag rejections, 4/2½.
V R Co Ld. Klang FMS	36 cases fine palish crepe, part sold, 5/5¾. 5 cases darker, 5/3½. 29 cases very fine palish crepe, 5/6 to 5/6¼. 2 cases darker, 5/4.
C M R E Ld.	13 cases fine pale and palish crepe, bought in. 9 cases fine palish to darkish crepe, bought in.
Beverlac	17 cases good to fine palish to darkish crepe, 5/6. 8 cases good scrap, bought in.

Mysore.

MARK.	QUANTITY, DESCRIPTION AND PRICE PER LB.
	1 case good biscuits and scrap, 4/-.

Java.

MARK.	QUANTITY, DESCRIPTION AND PRICE PER LB.
Tjidjerock	6 cases good rolled sheet, bought in. 2 cases and 1 bag somewhat similar, bought in. 1 case Rambong, bought in. 1 case pressed scrap, bought in.

GOW, WILSON & STANTON, LIMITED—
India Rubber Market Report.

13, ROOD LANE, LONDON, E. C.

May 24th, 1907.

At to-day's auction, about 709 packages of Ceylon and Malaya Plantation grown rubber were under offer, of which about 265 were sold. The total weight amounted to over 35¼ tons, Ceylon contributing about 7¼, and Malaya over 28 tons.

In the present dull condition of the Para Market buyers were not inclined to operate very freely, and, in consequence, the greater part of the offerings were withdrawn for want of support.

Fine Sheet was in fair demand at about from 1*d*. to 2*d*. per lb. decline on last sale rates and mostly sold, but other kinds were on the whole rather neglected, with the exception of the finest Crepe, one parcel of which realised the highest price recorded at the auction, *viz.*, 5/7 per lb. The lower grades of this were less enquired for.

TO-DAY'S QUOTATIONS.

Fine Block	5/6 to 5/6¼
Fine Sheet	5/5 to 5/5¼
Fine Biscuits	5/4 to 5/5¼

CREPE.

Very fine pale	5/6 to 5/7
Palish to darkish	5/2¼ to 5/5½
Dark	4/10 to 4/11½
Dark, pressed & block	3/6 to 5/2¾

SCRAP.

Fine	4/2½ to 4/3
Fair to medium	3/7½ to 4/2
Ball	3/4

PLANTATION AVERAGE, AND COMPARATIVE PRICES.

AVERAGE PRICE OF CEYLON AND MALAYA PLANTATION RUBBER.

To-day	265 pkgs.	5/2⅞
Same period last year	106 pkgs.	5/9½

Plantation.		Hard Fine Para.
Fine.	Scrap.	
5/4 to 5/6¼	3/7½ to 4/3	4/8¾
6/1 to 6/2¼	4/- to 5/3	5/3¼

Particulars and prices as follows:—

Ceylon.

Mark.	Quantity, Description and Price per lb.
Wavena	14 cases fine sheet, bought in. 4 cases good sheet, bought in. 1 case good rough sheet, bought in. 1 case fine palish biscuits, bought in. 1 case fine block, bought in. 1 case good dark block, bought in.
Culloden	13 cases good darkish pressed crepe, 4/11½.
Arapolakande	15 cases good dark biscuits, bought in. 3 cases fine palish to darkish biscuits, part sold, 5/5. 1 case good pressed scrap, bought in.

Mark.	Quantity, Description and Price per lb.
Ingoya	4 cases fine dark block, 5/6¼.
Kumbukkan	3 cases good palish to darkish biscuits, bought in. 1 case good scrap and rejections, bought in. 1 bag ball scrap, bought in.
Warriagalla	1 case fine blocked worm, 5/6. 1 case darker, bought in. 1 case good dark block, bought in.
Tallagalla	2 cases fine dark biscuits, 5/4¾. 3 cases good dark scrap, 4/2¾.
R	1 case very fine pale crepe, 5/7. 6 cases little darker, 5/5¼. 26 cases fine pale and palish, 5/4½ to 5/5½. 6 cases fine palish, 5/3. 1 case fine palish to darkish, bought in. 10 cases fine pale and palish, bought in. 3 cases fine darkish, bought in.
Ambanpitiya	1 case fine pale to darkish biscuits, 5/4. 1 case good scrap, 4/-.
C B	4 cases good dull biscuits, bought in.
Waharaka	1 case good dark biscuits, 5/4¾.
Dolahena	1 case dark earthy scrap, 3/5½. 1 bag rejections, 3/5½.
C L	16 cases good darkish crepe, bought in.

Malaya.

Mark.	Quantity, Description and Price per lb.
Shelford	6 cases fine palish to darkish sheet, bought in. 4 cases good dark block (whitish inside,) bought in.
V R Co Ld. Klang F M S	20 cases fine pale and palish crepe, bought in. 4 cases good palish and darkish, bought in. 4 cases good blocked crepe (whitish inside), bought in. 6 cases good dark block, 5/2¾. 5 cases palish, 4/11¾.
K	3 cases fine washed sheet, 5/5. 7 cases fine palish crepe, 5/3¾.
R R S	9 cases fine amber sheet, 5/5¼.
M A B	1 case good rough sheet, 5/3¾.
J J V & Co	7 cases good darkish scrap, 4/2½. 1 case good scrappy rejections, 4/2½. 1 case scrappy rejections, 4/-. 1 case dark pressed scrap, 3/9. 8 cases good palish blocked crepe, bought in.
S S R	7 cases good rejections, 4/2. 1 case good scrap, 4/2.
P S E	3 cases dark block, bought in. 6 cases very fine amber sheet, 5/5¼.
B R R Co Ld.	16 cases fine dull washed sheet, 5/5. 12 cases fine pale, 5/5¼. 3 cases very fine pale amber crepe, bought in. 4 cases fine palish to darkish, bought in. 9 cases fine darkish, bought in. 34 cases good darkish and dark, bought in. 8 cases good dark, bought in. 6 cases rejected crepe, bought in. 2 cases dark crepe, bought in. 8 cases good brown, bought in. 5 cases fine pale amber crepe, bought in.

Mark.	Quantity, Description and Price per lb.
X	3 cases good dark block, bought in. 1 case somewhat similar, bought in.
L E MUAR Straits	11 cases good palish and brownish crepe, bought in. 52 cases very fine block, 5/6 bid. 11 cases fine pale, part whitish, bought in. 1 box good darkish block, bought in.
R P M	6 cases good dark block, bought in. 6 cases fine brownish crepe, bought in. 1 case fine pale and brownish, bought in.
Jugra Estate	3 cases fine amber sheet, 5/4½. 1 case good rejections, 4/2½. 5 cases fine palish and darkish crepe, bought in. 1 case fine pale, 5/6. 2 cases good darkish, bought in. 2 cases good darkish and dark, bought in. 1 bag good dark block, 3/6.
B M & Co.	3 cases good amber sheet, 5/5. 11 cases fine amber sheet, 5/5. 4 cases fine darkish scrap, 4/2¾. 3 cases good dark 4/2. 1 case thick rejections, bought in. 1 case rejected sheet, bought in. 1 bag good pressed scrap and rejections, 4/2½.
B & D	6 cases fine amber sheet, 5/5. 1 case good pressed rejections, 4/4. 1 case dark blocked scrap, 3/7½. 1 case good wound scrap, 3/4.
G KK B	2 cases very fine amber sheet, 5/5¼. 1 case good wound scrap, 3/4. 1 bag sheet and rejections, 4/2½.
GP	1 case good dark crepe, bought in. 1 case good palish and darkish, bought in. 3 cases fine darkish biscuits, 5/5¼ bid.
Mc I	1 case fine palish scrap, 4/3. 2 cases good rough biscuits, bought in. 1 bag good thick rejections, bought in.
E F H E	1 case dull biscuits, bought in.
S R SD	1 case good palish to darkish crepe, bought in. 2 cases good darkish, bought in.
SP S	1 case good wound scrap, 4/- bid.
F J R	3 cases good pressed Rambong, bought in.
Highlands Est.	53 cases fine washed sheet, 5/5 to 5/5¼. 8 cases fine palish crepe, 5/2¼ to 5/2½. 4 cases good darkish, bought in. 1 case good dark, bought in. 9 cases good brown, 4/10. 2 cases darkish blocked crepe, bought in. 5 cases good dark pressed, bought in. 6 cases good brown, bought in. 1 case fine pale block, bought in.
BNS	20 cases good rough sheet, bought in.
K E A	7 cases good pale and palish blocked crepe, bought in.

Mark.	Quantity, Description and Price per lb.
K E B	1 case good darkish blocked crepe, bought in.
K E C	1 case good darkish blocked crepe, bought in.
T E A C	2 cases good palish and darkish crepe, bought in.
T E B C	2 cases good palish to darkish crepe, bought in. 1 case good darkish, bought in. 3 cases good brownish and darkish, bought in.
T E A B	1 case good greyish blocked crepe (part heated), bought in.
L E B C	4 cases good brownish crepe, bought in.
Pataling	5 cases good darkish crepe, bought in.
HC	1 bag and 1 case good rough sheet and biscuits, bought in. 1 bag good rejections, bought in. 1 case lump scrap, 3/11½.
Glenmarie	2 cases fine pale and palish biscuits, 5/5¼. 1 case black pressed crepe, bought in.
T E C C	2 cases dark heated crepe, bought in.
T E B C	2 cases good darkish crepe, bought in.
T E A B	1 case good palish to darkish block, bought in. 1 case good palish blocked crepe, bought in.
A A A	2 cases fine amber sheet, bought in. 1 case fine darkish biscuits, bought in.
A A C C C	2 cases black pressed crepe, bought in.
M	5 cases good rough sheet, 5/5. 1 case dark pressed crepe, bought in. 2 cases brown, bought in.
	Java.
Tjidjeroek	9 cases and 1 bag good rolled sheet, bought in.

TEA, COFFEE & RUBBER SHARES.

MONDAY, MAY 6TH, 1907.

INDIAN.	Current Price.	Dividend for 1905.	Dividend for 1906.	Yield per cent. on last full Year's Div.
AMALGAMATED (£10), fully paid, Ord.	3–3½	nil	—	—
,, 5% Cum. Pref. (£10)	8½–9	(a) 3	—	3
ASSAM CO. (£20)	36–37	8½	*3½	4¼
ASSAM FRONTIER Ord. (£10)	9¾–10	6	—	6
,, 6% Cum. Pref. (£10) ...	10–10¼	6	*3	5⅞
ATTAREE KHAT (£5)	6½–7	8	*2½	6
BAROOARA Ord. (£10)	9–10	4	—	4
,, 5% Cum. Pref. (£10)	8–8½	5	*2½	6⅔
,, 5% Deb. (£100)	95–100	5	5	5
BENGAL UNITED Ord. (£10)	11–11½	7½	*2½	7
,, 5% Cum. Pref. (£10)	8¾–9¼	5	*2½	5½
BRAHMAPOOTRA (£5)	11¼–11¾	10	14	6
BRITISH INDIAN Ord. (£5)	3¾–4¼	nil	—	—
,, 5% Cum. Pref. (£5)	4½–5½	5	*2½	4 13/16
CACHAR & DOOARS Ord. (£10)	6½–7	nil	—	—
,, 6% Cum. Pref. (£10) ...	9–9½	6	*3	5½
CHARGOLA Ord. (£1)	1⅛–1 3/16	7	*2½	5½
,, 7% Cum. Pref. (£1)	1⅛–1¼	7	*3½	5⅝
CHUBWA Ord. (£5)	7½–7¾	10	*3½	7
,, 7% Cum. Pref. (£5)	6¼–6½	7	*3½	6
CONSOLIDATED Ord. (£10), £10 paid	3¾–4¼	—	—	—
,, 5% Cum. 1st Pref. (£10)	9–9½	(a) 7	—	7⅓
,, 7% Cum. 2nd Pref. (£10) ...	10½–11	—	—	—
,, 4½% Deb.	93–96	4½	—	5
DARJEELING (£20)	15–16	4½	—	5
DARJEELING Con. Ord. (£10)	4–4½	—	—	—
,, 5% Cum. Pref. (£10)	8¼–8½	5	—	6
DOOARS Ord. (£10)	21–22	12½	*2½	6
,, 7% Cum. Pref. (£10)	13½–14½	7	*3½	5
DOOM DOOMA (£10)	17¾–18¼	10	*5	5½
EASTERN ASSAM (£5)	7⅜–7⅞	6	—	4
EMPIRE OF INDIA Ord. (£10)	11¼–11¾	5	*2½	5½
,, 5% Cum. Pref. (£10)	8¾–9	5	*2½	5½
IMPERIAL TEA Ord. (£10)	8¼–8¾	4	—	4½
,, 5% Cum. Pref. (£10)	8¾–9¼	5	*2½	5½
JOKAI Ord. (£10)	12½–13	7	*2½	5
,, 6% Cum. Pref. (£10)	12–12½	6	*3	4¾
JOREHAUT (£1)	40/–42/	10	*2½	4
KANAN DEVAN Ord. (£10, fully paid)	4–5	nil	—	—
,, 6% Cum. Pref. (£10)	8–9	6	—	6⅔
LEBONG (£8)	12–12½	10	10	6⅜
LUNGLA, Ord. (£10)	8–8½	3	—	4
,, 6% Cum. Pref. (£10)	10–10½	6	*3	5¾
,, 5% Deb.	99–101	5	5	5
MAKUM, (10s.)	⅝–¾	4	—	4
,, 5% Deb.	93–95	5	5	5¼
MAJULI Ord. (£10)	8–8½	5	—	6
,, 6% Cum. Pref. (£10)	10–10½	6	*3	5¾
MOABUND Ord. (£1)	1⅛–1¼	6	*3	5
,, 5% Cum. Pref. (£1)	1 3/16–1 5/16	5	*2½	6
,, 5% Deb. (£100)	96–100	5	5	5
NEDEEM, Ord. (£10)	10¼–10½	2½	—	2
,, 5% Cum. Pref. (£10)	8½–8¾	5	*2½	5¾

Tea, Coffee & Rubber Shares.—*Continued.*

INDIAN.—*Continued.*	Current Price.	Dividend for 1905.	Dividend for 1906.	Yield per cent. on last full Year's Div.
SEPHINJURI BHEEL (5s.) new	$\frac{3}{4}$–$\frac{13}{16}$	25	*10	7½
SINGLO, Ord. (£10)	4–5	—	—	—
„ 6½ non Cum. Pref. (£10)	7–7½	—	—	—
CEYLON.				
ALLIANCE, Ord. (£10)	10–11	7	*3	6½
„ 6% Deb.	100–103	6	6	5¾
ANGLO CEYLON, 5% Deb. (£100,000) new ...	98–100	5	5	5
„ Ord. Stock	125–130	6	—	4½
„ Surplus Certificates	80–90	—	—	—
BANDARAPOLA, Ord. (£10) fully paid	18–20	7½	7½	3¾
„ „ (£10) £5 „	8–8½	7½	7½	4½
„ „ (£10) £5 „ (new) ...	7½–8	—	7½	4¾
CEYLON TEA PLANT, Ord. (£10)	36–37	15	15	4¼
„ 7% Cum. Pref. (£10)	15–16	7	7	4⅜
CEYLON PROPY., Ord. (£1)	11/6–12/6	2	—	3½
„ 5% Cum. Pref. (£1)	⅝–⅞	5	5	6
CONSOLIDATED ESTATES, Ord. (£10)	16–17	8	*4	4½
„ „ Pref. (£10)	12–13	8	*4	6⅛
DIMBULA VALLEY, Ord. (£5)	6–6¼	8	8	6½
„ 6% Cum. Pref. (£5)	6–6¼	6	6	5
EASTERN PRODUCE, Ord. (£5)	7⅜–7⅝	6	7½	5
„ 5% Cum. Pref. (£5)	5–5½	5	5	$4\frac{13}{16}$
NEW DIMBUDA, (£1)	3⅝ 3⅞	24	—	7
NUWARA ELIYA, (£10)	11–11½	7	7	6
PANAWATTE T & RUBBER, (£5)	7¼–7¾	—	2	1½
„ „ (£5) £3 paid ...	1–1½pm	—	2	1½
STANDARD, (£10) £6 paid	13¼–13¾	15	15	6½
„ (£10) £10 paid	23–25	15	15	6
YATIYANTOTA, Ord. (£10)	16–16½	5	5	3
„ 6% Cum. Pref. (£10)	10½–11	6	6	5½
COFFEE COMPANIES.				
DUMONT, Ord. (£10)	1⅜–2	—	—	—
„ 7½% Cum. Pref. (£10)	7½–8	(*a*) 11¼	(*a*) 5½	6
„ 5½% Deb.	98–101	5½	5½	5½
SAN PAULO, 5½% Deb.	98–100	—	—	5½
RUBBER COMPANIES.				
ANGLO-MALAY, £140,000 Ord. (£1) 12/6 paid ...	2¾–2⅞	—	18	4
BATU CAVES, £11,000 Ord. (£1) 10/- paid ...	$1\frac{9}{16}$–$1\frac{11}{16}$ pm	—	—	—
BUKIT RAJAH, £66,700 Ord. (£1) fully paid ...	$5\frac{1}{16}$–$5\frac{3}{16}$	6	*5	1½
CONSOLIDATED MALAY, £55,000 (£1) fully paid ...	2⅜–2½	—	10	4
CEYLON COCOA & RUBBER, £15,000 Ord. (£1) ...	1½–2	—	—	—
CICELY RUBBER ESTATES, £6,000 Ord. (£1) ...	2⅝–2⅞	5	—	—
„ „ „ £4,500 5% Pref. (£1) ...	3–3¼	10	—	—
GOLDEN HOPE, £40,000 Ord. (£1)	1⅜–1½	—	5	3½
HIGHLANDS PARA, £181,454 fully paid	$2\frac{3}{16}$–2¼	—	—	—
„ „ £60,000 Ven. £1,7/6 paid ...	nom.	—	—	—
„ „ £63,546 qtd , £1,7/6 paid ...	[illegible] $1\frac{1}{16}$ pm	—	—	—
FED. SELAN. £20,000 fully paid	2¾–3	—	—	—

Tea, Coffee & Rubber Shares.—*Continued.*

Rubber Companies.—*Continued.*	Current Price.	Dividend for 1905.	Dividend for 1906.	Yield per cent. on last full Year's Div.
Java Rubber & Produce, £35,000 (£1) 15/- paid ...	par $\frac{1}{16}$ p	m —	—	—
Klanang Produce (£20,000)	$4\frac{1}{4}$–$4\frac{1}{2}$	$7\frac{1}{2}$	—	2
Linggi Plantation, £19,866, (£1) fully paid ...	4–$4\frac{1}{4}$	4	*5	—
,, ,, £10,000, (£1) 5s. paid ...	$2\frac{1}{4}$–$2\frac{1}{2}$ p	m 4	*5	—
,, ,, £10,000, £1 f. pd., 7% Pref. ...	$1\frac{1}{16}$–$1\frac{3}{16}$	7	7	—
Malacca Rubber, £115,000 $7\frac{1}{2}$% c p., (£1) ...	$1\frac{1}{8}$–$1\frac{1}{4}$	$7\frac{1}{2}$	*$3\frac{3}{4}$	6
,, ,, £185,000, Ord. (£1) ...	nom.	—	—	—
Monerakelle Rubber, (£16,400) 7/6 paid ...	par $\frac{1}{8}$ pm	—	—	—
Pataling, £20,000 Ord., £5,000 Mtge. ...	$6\frac{3}{4}$–7	20	40	$5\frac{3}{4}$
Seafield Rubber, £96,000 7/6 paid	4/0–5/0	pm—	—	—
Selangor, £26,300 Ord. (£1) fully paid ...	8–$8\frac{1}{4}$XD	(*f*) 20	40	5
Shelford Rubber Estates, £65,000 (£1) f. pd. ...	$\frac{7}{8}$–1	—	nil	—
Sungei Way, £41,920 Ord. (£1) 10/- paid ...	$\frac{7}{8}$–$1\frac{1}{8}$ p	m nil	nil	—
Vallambrosa, £50,000 Ord.	$7\frac{1}{8}$–$7\frac{3}{8}$	—	*15	—

* Interim Div. 1906. (*a*) A/c of Arrears. (*c*) Including 1% bonus.
(*d*) Including $2\frac{1}{2}$% bonus. (*e*) For year 1903/4. (*f*) Paid in Sungei Way Shares.

Malacca.

Abstract of Meteorological Readings for the month of May, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
		°F	°F	°F	°F	°F	°F	°F	°F	%		Ins.	Ins.
Durian Daun Hospital ...	Barometer out of order.	145·0	80·4	88·7	73·6	14·8	81·1	1·048	69·9	93	N.W.	11·39	3·95

F. B. CROUCHER,
Colonial Surgeon, Malacca.

COLONIAL SURGEON'S OFFICE,
MALACCA, *20th June*, 1907.

Penang.

Abstract of Meteorological Readings for the month of April, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Mean Maximum.	Mean Minimum.	Mean Range.	Mean Wet Bulb.	Mean Vapour Tension.	Mean Dew Point.	Mean Humidity.			
	Ins.	°F	°F	°F	°F	°F	°F	°F	°F	%		Ins.	Ins.
Criminal Prison Observatory	29·905	153·3	83·9	93·9	75·1	18·8	77·3	·823	72·8	72	N.	1·43	0·53

M. E. SCRIVEN,
Assistant Surgeon.

T. C. MUGLISTON,
Colonial Surgeon, Penang.

Colonial Surgeon's Office,
Penang, 10*th May*, 1907.

Penang.

Abstract of Meteorological Readings for the month of May, 1907.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Mean Maximum.	Mean Minimum.	Mean Range.	Mean Wet Bulb.	Mean Vapour Tension.	Mean Dew Point.	Mean Humidity.			
	Ins.	°F	°F	°F	°F	°F	°F	°F	°F	%		Ins.	Ins.
Criminal Prison Observatory	29·896	140·2	85·4	91·7	75·0	16·5	74·3	·838	67·1	79	S.E.	5·94	1·30

M. E. SCRIVEN,
Assistant Surgeon.

T. C. MUGLISTON,
Colonial Surgeon, Penang.

COLONIAL SURGEON'S OFFICE,
PENANG, *8th June*, 1907.

Selangor.

Abstract of Meteorological Readings in the various Districts of the State for the month of May, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
General Hospital, Kuala Lumpur	29·883	149·2	80·8	90·5	71·8	18·7	76·5	0·830	73·6	79	Calm	7·55	2·53
Pudoh Gaol Hospital ,, ...	...	...	...	...	...	...	...	...	...	...	...	4·50	1·47
District Hospital ,, ...	...	...	...	...	...	...	...	...	...	...	...	2·52	0·77
,, Klang	...	...	...	88·5	71·7	16·8	...	...	...	...	...	6·79	1·39
,, Kuala Langat	...	...	...	...	...	...	...	...	...	...	...	2·06	0·56
,, Kajang	...	...	...	86·9	76·7	10·2	...	...	...	...	...	8·83	1·59
,, Kuala Selangor	...	...	...	...	...	...	...	...	...	...	...	4·35	1·50
,, Kuala Kubu	...	...	...	...	...	...	...	...	...	...	...	7·18	3·15
,, Serendah	...	...	...	...	...	...	...	...	...	...	...	7·55	0·94
,, Rawang	...	...	...	90·2	71·9	18·3	...	...	...	...	...	5·18	0·90
Beri-beri Hospital, Jeram	...	...	...	...	...	...	...	...	...	...	...	6·84	1·75
Sabah Bernam	...	...	...	...	...	...	...	...	...	...	..	6·49	2·27

State Surgeon's Office,
Kuala Lumpur, *17th June*, 1907.

W. FLETCHER,
Acting State Surgeon, Selangor.

Perak.

Abstract of Meteorological Readings in the various Districts of the State for the month of May, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature. Mean Dry Bulb.	Temperature. Maximum.	Temperature. Minimum.	Temperature. Range.	Hygrometer. Mean Wet Bulb.	Hygrometer. Vapour Tension.	Hygrometer. Dew Point.	Hygrometer. Humidity.	Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
Taiping ...	...	153	82·28	93	71	22	78·39	921	...	84	...	7·69	2·29
Kuala Kangsar ...	...	...	80·84	93	70	23	76·35	847	...	80	...	6·95	1·90
Batu Gajah ...	...	156	81·69	93	69	24	76·81	857	...	80	...	4·85	1·28
Gopeng ...	...	...	81·47	92	64	28	76·51	846	...	78	...	4·93	·78
Ipoh ...	...	...	81·34	93	74	19	77·76	903	...	85	...	5·90	1·93
Kampar ...	...	...	81·20	92	70	22	78·41	935	...	88	...	2·73	1·18
Teluk Anson ...	...	...	82·46	93	70	23	77·65	883	...	80	...	4·52	·63
Tapah ...	...	...	81·61	92	68	24	77·21	875	...	81	...	12·92	2·59
Parit Buntar ...	...	...	82·96	93	72	21	77·96	893	...	79	...	3·06	·51
Bagan Serai ...	...	...	82·65	92	71	21	77·65	883	...	79	...	4·24	1·58
Selama ...	...	...	82·09	92	72	20	77·93	905	...	83	...	7·23	1·35

State Surgeon's Office,
Taiping, 22*nd June*, 1907.

M. J. WRIGHT,
State Surgeon, Perak.

The Duff Development Company, Limited, Kelantan.

Abstract of Meteorological Readings for the month of May, 1907.

DISTRICT.	Temperature.			Total Rainfall.	Greatest Rainfall during 24 hours.
	Maximum.	Minimum.	Range.		
	Mean. °F	Mean. °F	Mean. °F	Inches.	Inches.
Kuala Lebir ..	87·5	71·8	15·6	7·14	1·68
Serasa ...	92·0	71·5	20·5	7·26	1·15
Kuala Kelantan ...	86·5	73·3	13·2	3·93	1·15

A. FREDERICKS,
Dresser in Charge.

SURGEON'S OFFICE,
KUALA LEBIR, *7th June*, 1907.

AGRICULTURAL BULLETIN
OF THE
STRAITS
AND
FEDERATED MALAY STATES.

No. 8.] AUGUST, 1907. [Vol. VI.

PANDANS.

The order *Pandanaceæ* includes only two or three genera. *Freycinetia*, climbing plants, *Sararanga*, a strange plant of the Polynesian Islands and the large genus *Pandanus* of which we give a photograph of a very fine specimen in the Botanic Gardens, Singapore, *viz. Pandanus Kaida*. The plant figured is about ten years old, and is a native of India, and is the finest specimen in the Gardens, though there are others older, owing to its position on the island where its roots have freer access to the water.

The *Pandani* are trees or shrubs with branched stems, which emit conspicuous stout stilt roots, furnished with a very distinct root-cap, by means of which roots the rather weak stem supports itself, and as in many cases the branches emit roots also some species branching low, form eventually a dense forest or thicket of stems almost impenetrable. *Pandanus labyrinthicus* cultivated in the Economic Gardens has thus formed a huge mass of vegetation impossible to penetrate. The stems of these plants are occasionally somewhat hard outside, and often armed with small thorny processes, suppressed rootlets but are softer inside as is the way of monocotyledonous trees, and as they quickly decay when cut, the stems are practically useless. The leaves are long and narrow, linear, stiff and end in a short or long point. They are armed in nearly all species with short pale or dark coloured thorns along the midrib and edges. The leaves are the most useful part of the plants, being used for roofing, under the name of attaps, and for covering of oxcarts known as kajangs. The trees are unisexual, the male flowers being borne on different plants from the females. And usually the males are extremely rare in proportion to the female plants. In hundreds of plants of *Pandanus parvus*, and of *P. ornatus* I have only once come across a male plant, while in many species the males are quite unknown. The male flowers are borne in white catkins often several together, and subtended by long white bracts, leaves shortened and white but otherwise similar to the other leaves. They are borne on the ends of the branches among the terminal leaves and hang down from between them. They are

usually powerfully, and often sweetly scented, and were they more abundant and easily procurable, a good perfume might be extracted from them. There is no perianth but the small flowers consist of leafy spathes, crowed on a calkin-like spadix.

Pandani are easily propagated by cuttings from the sides of the stem and grow usually with considerable rapidity. They can also be easily raised from seed, when it is procurable, which is not often the case as in so many cases the male plants are so scarce that fruit is never seen. *Pandanus parvus*, a very common species in Singapore woods. I have only seen a single male of and never any fruits ripe. *P. ornatus* again very rarely produces male flowers, and I have seldom seen a ripe fruit. *P. Kaida*, on the other hand fruits regularly, and produces abundance of seeds. Most of the Pandans prefer damp low lying ground, and some like *Pandanus immersus* are quite aquatic. This is a very conspicuous species in Selangor and Perak, growing immersed in the water of lowland streams and sending up its tall erect swordlike grey leaves.

Pests.—The Pandans when planted out are liable to the attacks of a very beautiful beetle, one of the chafers *Agestrata orichalca*, L. A very large oblong beetle about an inch and a-half long of a splendid metallic green. This insect may often be seen at certain seasons of the year flying round pandan bushes, in the evening. The eggs are laid in the terminal shoots of the Pandan, and the grub burrows into the stem, making a large burrow. The leaves of the shoot are gnawed and present a ragged appearance.

Uses of Pandani.—The chief use of the Pandani lies in their stiff leaves which are used for roofing, and making mats, bags, cigarette cases, and other such purposes. Kajangs are made from the leaves of *Pandanus atrocarpus*, Griff. The leaves which are of great length and about 4 inches across, are dried and fastened together with split rattan forming the thoroughly waterproof covering for carts, and other purposes. Portions of leaves are also used for making hats.

Baskets and mats, as well as cigarette cases, are made of the leaves of *P. fascicularis*, a common seashore shrub which is also cultivated frequently for the purpose. An account of the manufacture of Malacca baskets is published by Mrs. BLAND in the *Journal of the Royal Asiatic Society*, Vol. XLVI, 1906, page 1.

Pandanus sp. probably one of the several species known as *P. laevis* is often cultivated for its leaves which are greyish green in colour and quite thornless. These leaves when bruised have a slight odour, and are put into rice when boiling to flavour it. They are also used in a kind of pot-pourri composed of these leaves finely cut up, shavings of sandalwood, and rose water, which is distributed at Malay weddings. This plant I have never seen in flower or fruit nor have I ever met a Malay who has. It appears to be a native of Java and is common in all native villages.

Ornamental species.—The Pandans are often cultivated as ornamental plants both in the tropics and in conservatories in various

parts of the world for their elegant and often variegated foliage. They are very easy to cultivate, being propagated by cuttings which grow very readily. When planted out they are apt to be attacked here by a moth-caterpillar which I have not succeeded in rearing, which attacks the growing bud, and biting through the tender part of the shoot destroys it so that the leaves fall out of the bud. The caterpillar chiefly attacks the broad-leaved species. They are also often troubled with attacks of scale insects which are very troublesome to get rid of.

Among the ornamental species may be mentioned *Pandanus Houlleltianus*, a native of Singapore in which the broad linear leaves are especially when young of a beautiful purple tint. It is a rather large species with a little branched stem about 12 or 15 feet tall. The head of fruit is oblong about 2 feet long and when ripe is orange coloured, and becomes pulpy having a very pleasant taste something like that of a pineapple. It is seldom to be seen in fruit however.

Pandanus Veitchii of gardens is a white striped variety of *P. javanicus*, frequently the leaves are entirely white. It has long been in cultivation in Singapore, but eventually if left to itself forms a large low irregular spreading thicket of green leaves only.

Pandanus Sanderiana, a recently introduced species is also edged with white with a yellowish tinge and is a very handsome plant, but specimens planted out in the Gardens have, like *Veitchii*, become altogether green leaved.

P. ornatus is a native of Singapore, it is a narrow grassy-leaved plant forming a bush about eight feet tall, the leaves are very long and narrow, and of a glaucous grey colour. Another pretty narrow-leaved species is *P. graminifolius* of Burmah. This grows with great rapidity, and a plant in the damp ground of the Economic Gardens has formed a low thicket about three feet tall and occupies an area of 646 square feet. Its leaves are about 22 inches long by less than ½ inch broad and of a deep green. It is a very pretty pot plant.

P. Sp.—A native of the Selangor hills, has rather narrow leaves of a polished grey colour, and another species has when young dark almost black leaves.

P. parvus is one of the smallest species having a stem about four feet tall and rather broad grey green leaves ending abruptly in a long tail. It is a native of Singapore.

P. penangensis is a large plant with a stout stem about twenty feet tall and long and broad leaves, which when young are rather light green, mottled with a darker colour. It is a native of Penang hill.

A very fine species is the broad-leaved *P. macrophyllus* of New Guinea which has very broad bright polished green leaves.

List of Pandani cultivated in Singapore Botanic Gardens.

P. atrocarpus, Griff. "Mengkuang", native of the Malay Peninsula.
P. bicornis, Ridl. ... ... Selangor.
P. elatus, Ridl. ... ... Christmas Island.
P. fascicularis, "Pandan Duri", Mengkuang in Malacca. Common on Sea coasts. A large shrub with orange coloured heads of fruits as big as a human head.
P. graminifolius, a bush with narrow leaves ... Burmah.
P. Houlletianus, Carr. "Pandan Hutan" ... Singapore.
P. labyrinthicus ... ... Java.
P. laevis? "Pandan Jelinkek ... ...
P. kaida ... ... India.
P. luzonensis .. ... Philippines.
P. macrophyllus ... ... New Guinea.
P. ornatus, Gaad. ... ... Singapore.
P. parvus, Ridl. ... ... Singapore.
P. penangensis, Ridl. ... ... Penang.
P. samak ... ... Java.
P. sanderiana ... ...
P. Veitchii ... ...
P. militaris, Gaud. ... ...
Doubtful species. A narrow-leaved epiphytic plant from Johore.

SOME INSECT PESTS, ATTACKING PALAQUIUM GUTTA VAR: OBLONGIFOLIA, AND AFZELIA PALEMBANICA IN MALAYA.

Ever since the Gutta Percha (Palaquium gutta var: oblongifolia) and "Merbau" (Afzelia palembanica) trees were first planted by the Forest Department in the Federated Malay States several species of Lepidopterous larvæ (*Rhodoneura myrtoea var: fenestrata* belonging to the Family *Thyrididæ*, a *Tortricid* and a *Tineid*) were noticed to feed freely on their leaves.

As the area planted in these trees increased, the damage wrought to them by these insects became a matter of considerable importance.

During the months of March and April of this year their numbers have assumed such a proportion that a large amount of damage is being caused to both the young and old trees. Indeed it is now difficult to find a tree that has not suffered, at some time of the present year to a greater or less extent. The rapid increase in individuals of these insects has led to the investigation of the cause of the disease in order to ascertain such remedies as might be applicable to the area under cultivation.

My observations are not complete in either the one species attacking Palaquium, (*Rhodoneura myrtoea var: fenestrata*) or the two (a *Tortricid* and a *Tineid*) which confine their depredations to Afzelia.

Many interesting and important points connected with the life history of these insect pests require yet to be investigated. Their natural enemies parasitic or otherwise have not been studied owing to the lack of time at my disposal for this work. Before the elucidation of these essential points, any remedial measure should be considered as tentative, although the cure suggested may finally prove to be the soundest and the cheapest.

The majority of planted Gutta Percha trees are between 2-4 years old, these being the ones that are chiefly suffering; the older ones however do not by any means remain untouched.

With regard to the parasites, I have observed several species of *Ichneum nidæ* hovering round the leaf houses constructed by *Rhodoneura myrtoea var: fenestrata,* and it is highly probable that the eggs are parasitised to some extent by other *Parasitic Hymenoptera.*

The sudden increase of these pests is in all probability due to the cutting away of the undergrowth, thus interfering with their food plants, and by supplying other trees which it seems evident are better suited as a food for these pests, and favourable to their multiplication.

GUTTA PERCHA PEST.

Rhodoneura myrtoea var : fenestrata. Drury.

Description.

In the "'slands Plantentiun LXIV door, Dr, J. C. KONINGSBERGER" a few species attacking Palaquium are dealt with, and among these is the species with which we are chiefly concerned here *viz: Rhodoneur myrtoea var: fenestrata.* On plate 3 Fig. 24, he figures this insect, and on plate 5 Fig. 2 a sketch of a rolled leaf is given.

Though the eggs of this insect have not been found I am of opinion that comparatively old leaves are chosen for oviposition, the larvæ on hatching making their way to the various shoots of the tree. On many occasions I have obtained young larvæ that have hatched but a few hours previously, and have found on examining the other shoots of the tree that they also have become tenanted. It may therefore be safely said that almost immediately after hatching the larvæ disperse, and an abode having been selected, mining operations are at once begun.

A not uncommon occurrence is to find two larvæ contained within a single bud, this condition being due to the number of young shoots being insufficient to accommodate separately the larvæ that may have hatched from the eggs laid on the tree.

When this happens the greater part of the larval life is often passed in this mutual condition.

By choosing for its first haunt the very young shoots which have not yet opened the necessity of drawing the leaf edges together for concealment is avoided, seclusion being naturally afforded by the unopened leaf. The irritation caused by the larva to the young leaf prevents its subsequent opening in the natural manner.

The length of the young caterpillar is from 2-2·5 mm., ($\frac{1}{8}$th inch) its head varies greatly in colour, the abdomen is reddish pink.

If we examine a newly attacked tree and open the young shoots containing the larvæ, we shall find that the epidermis of the leaf is being eaten away in, sometimes a tortuous manner, in others in irregular small patches which appear of a fresh green colour and may be distinctly seen against the dull green of the upperside of the young leaf.

When the epidermis has been partially devoured, fresh leaves are searched for, and it is fairly typical of this species to draw the somewhat older leaves surrounding the young shoot around the latter, devouring these as necessity arises. It is unlikely that less than 20 eggs laid by the female of this insect, so that if we take this as the minimum number it will be obvious that a week after the larvæ have appeared and have dispersed into the young leaves, no new buds are visible, the surrounding leaves have been drawn together encircling the former, and forming a leaf house. These bunches of leaves may be seen on nearly all the Gutta Percha trees here.

When the larva is about five days old and the leaf house is formed, it commences mining in earnest. Starting from either the base or apex of a leaf it eats the epidermis regularly on either side of the midrib, leaving untouched only the extreme edges of the leaf. One half is however soon abandoned, the larva confining its attacks to one side of the leaf the epidermis of which is rapidly eaten. Its size by the 8th day has greatly increased being, 18 mm. ($\frac{3}{4}$ inch) and in the majority of cases it now vacates its original house taking possession of fresh leaves on some other part of the tree. This is again abandoned in a few days and yet another house is formed. Thus a single larva by repeatedly changing its house, besides killing the new shoots and the adjacent younger leaves, also destroys several mature leaves, and the combined effects of the larvæ hatched from the eggs laid by a single female have a very disastrous effect upon a tree.

About fourteen days after hatching the larva is adult; it makes its escape by pushing its way through the dead part of the leaf and dropping to the ground it pupates just below the surface. Three weeks later the adult insect emerges.

While occupied the leaf is always moist inside, a condition necessary to the well being of the larva, and in addition it has in all probability the effect of decomposing to a certain extent the tissues of the leaf.

The foregoing gives a brief account of the life history of this insect as far as it is known to me; but it may be as well to mention another form of leaf house constructed by this species.

Two leaves are employed in this case. That which is immediately above the one on which the larva intends feeding is drawn down and attached by threads to the lower usually in a crosswise manner.

Its method of mining is the same but necessarily more confined, as, in being placed crosswise only a small portion of the leaves affords concealment, usually about 1½ square inches. The excrement is packed away around the margin of the mined portion.

The duration of the larval life is fourteen days, that of the pupal three weeks, and if we take the length of the egg stage as 8 days, the life cycle of this insect is completed in six or seven weeks, making it probable that five or more broods appear in the course of a year.

Depredation.—Taking as the typical mode of attack the rolled leaf and not the method last described of sewing two leaves together in a crosswise manner, the larva first commences its depredations in the young shoot.

As it becomes older the young shoot is encircled by the somewhat older leaves. These are mined, causing them after the larva has escaped to wither and drop. The apex of the stem also dies back for some distance. Before the larva is adult it has done considerable damage to many leaves, and although fifteen or twenty larvæ do not kill the tree, they are very successful in checking its growth. It must also be noted that if allowed to increase at will this insect with its rapid metamorphosis renders it impossible for the trees to recover from their previous injuries before they are again attacked.

Larva.—The newly hatched larva is 2-2·5 mm. (⅛th inch) long, and in colour somewhat light reddish brown. The thoracic legs are dark.

The adult larva is very variable in colour some specimens of a dull blackish purple, others dull yellow their intestinal contents giving them a blackish hue dorsally. A double series of shiny tubercles on the upper side running in longitudinal parallel lines, and of irregular shape. Head yellowish or reddish suffused with black anteriorly, sometimes only slightly. Mandibles at tip red; first thoracic segment hard, shining black or brown. Under side of abdomen pale yellowish. Three thoracic legs varying in colour between pale yellowish and black. Four abdominal feet, one pair claspers. Their single long hairs springing from the sides of the body. Average length about 27 mm. (1⅛th inch).

The pupa is about 12 mm. (½ inch) long, dorsally dark in colour, ventrally somewhat lighter. It is contained within a cemented earthen chamber a little below the surface of the ground. The pupa makes its way to the surface just before the adult insect is ready to emerge.

Moth of Rhodoneura myrtoea.—The following description is taken from Hampson's *Fauna British India* Vol. 1, page 358. "Differs from myrsusalis in being brick-red; the striæ less distinct. Fore wing without the yellow costa. Under sides suffused with pink, striæ well defined; a dark brown subapical patch on the margin of the fore wing.

The form fenestrata has two hyaline spots on the fore wing, with an ochreous streak between them."

The specimens I have do not entirely answer to this description, but do not differ sufficiently to demand a separate description. The form found here is nearest to fenestrata, although the yellow costa is present. The colour however is brick-red. The suffused pink on the under side is not obvious.

Tortricidæ.

Pests attacking *Merbau* (*Afzelia palembanica*).

Capua Sp.—Certain species of this family are the cause in their larval state of much damage to a large variety of cultivated and forest trees.

In Ceylon Capua coffearia has been the source of considerable trouble to the planting community there, and in Java Dr. ZIMMERMANN draws attention to a species of this family as attacking the coffee planted in that country.

Here a Capua is defoliating the Merbau trees.

Description.—The eggs are laid on the upper side of the leaf; they are flat and overlapping, rendering their appearance scaly. Their surface is shiny, and with a slight irridescence. A single female is capable of laying a large number of eggs, batches collected varying in number between 50—400. The newly disclosed larva is of a yellowish colour with a shining jet-black head.

I am unable to say whether the young larvæ are at first gregarious or not, but judging from my observations I am inclined to believe that they are until the first moult has taken place. For the purpose of feeding, a small portion of a leaf is drawn together, being held in this position by threads attached to either side of the leaf. The enclosed portion is now riddled, very irregularly. The veins, at any rate the larger ones, are avoided at the commencement of the larval life. Often in the later stages, however, the veins are also devoured. As the larval life progresses a greater portion of the leaf is enclosed, but comparatively little is eaten away. This may be taken as typical of the species in question for it is always the case, that, after having eaten a small portion of the leaf the larva escapes commencing its ravages in another place. This habit of continually changing its scene of operation during its larval life renders its depredations vastly greater than they otherwise would be. Before vacating its house, or before pupation takes place, the threads which hold the leaf in position, are severed thus allowing the leaf to uncoil.

To recognize leaves that are attacked, requires very little skill. (They may be attacked by either this or the succeeding species). They are slightly drawn together, and present a contorted appearance.

The holes made in the leaves are easily seen, and often a further indication of the presence of the insect is that the holes are woven over with silk which prevents ants and other natural enemies from gaining an entrance.

The length of the time occupied from the hatching of the egg to reach the adult larval state is rather variable, but three weeks may be taken as a fair average. When adult the larva coils a portion of the leaf over itself and pupates. The colour of the pupa is light brown at first, later attaining a darker colour. Length 10-13 mm. In about eight days the adult insect emerges.

Larva.—Greenish on the upper side; somewhat sage coloured in some specimens. Head and first thoracic segment hard, shining jet-black. A series of small tubercles running in four longitudinal parallel lines on the dorsal surface. Three thoracic legs, first and second of same colour as the head, third semi-transparent, black at apex. Four abdominal feet one pair of claspers. Single long hairs spring from the body. Length when adult about 15 mm.

Moth.—The moth is a very variable insect in colour, descriptions are given of the two commonest forms.

1. *Fore wing; upper side.*—Ground colour rich black purple or brownish. Thickly scaled; fringe of the outer margin brownish, at apex black. Irregular blotches of rich brown and yellow distributed over the wing.

Hind wing; upper side.—White at costal margin, yellow before apex, greyish posteriorly.

Under side of fore wing white on inner margin. Costa with two yellow spots, one half way along, and one near apex. Anterior portion of hind wing on under side suffused with yellow, remainder greyish. Head and thorax thickly scaled with rich purple scales. Antennæ of same colour as head at basal joints, remainder yellow palpi brownish or yellowish; four posterior legs yellow, anterior pair darker.

2. *Fore wing; upper side.*—Red brown. Black and light yellowish brown striæ. A dark spot on costal margin of fore wing. Markings on upper side of hind wing same as in the other form.

Fore wing; under side.—Apical and outer margin yellow extending as far as discocellular. Basal portion of costa yellow. The black irregular striæ more distinct than on the upper side. Remainder of wing dull grey.

Hind wing; under side.—Costal margin pale yellow, becoming darker towards outer margin. Remainder of wing dull grey.

Exp. 20 mm.

Tineidæ.

Tineid Sp.—Many of the species of this family are notorious for the destruction which they cause to vegetation and as a Tineid is defoliating Afzelia palembanica in Malaya a few words on the fragmentary knowledge I have of its life history will not be out of place.

The eggs although undoubtedly laid on Afzelia palembanica, have not been found.

Young larvæ have been obtained. They are of a yellow colour, and possess three thoracic legs, and four abdominal feet. The head is light yellow. Length when adult 12 mm. (½ inch).

After having searched carefully for this insect on Palaquium Gutta var. oblongifolia I have come to the conclusion that this tree is not suitable as a food plant, not a single larva or cocoon having been observed on this tree. On the other hand it would be difficult to pass through a mixed plantation of Palaquium Gutta var. oblongifolia and Afzelia palembanica without noticing the silken white cocoons on the upper side of the leaf of the latter tree. They are longly ovoid in shape and depressed, and the pupa may be distinctly seen within. The larva works in concealment drawing the leaf together in much the same way as Capua, but more of each leaf is usually eaten.

The duration of the larval life is less than a fortnight. The pupal stage is about one week, and the life cycle is probably completed in one month or even less. There must be at least six or seven broods per year.

The moth is of a silvery grey colour with several irregular white spots distributed over the fore wing.

The hind wing pointed at apex with very long black brown fringes. Exp. 10 mm.

Remedy.—There should be but little difficulty in reducing these pests to a minimum number. In each species it is easy to recognize the attacked leaves.

A gang of coolies should be engaged to collect every leaf that is affected as in some instances I have found young larvæ frequenting abandoned leaves. The eggs of Capua are easily seen, and it is therefore important that the coolies be acquainted with their appearance and instructed that these must be collected and destroyed. The leaves and eggs could be collected in baskets, and after a morning's work the whole placed in piles and burnt. By systematic and persistent gathering of the eggs of Capua and the leaves affected by these pests they will gradually decrease; they have now gained a thorough hold and it may be some months before any appreciable diminution in their numbers will be evident. A careful look out should be kept for the first appearance of a brood of Rhodoneura. Owing to their habit of confining their attacks in the first instance to the young shoots, which they cause to become

contorted, their presence may easily be detected. All such shoots should be immediately gathered, or if quite freshly attacked the larvæ can be killed before they have done any damage. I wish to thank Mr. BURN MURDOCK, Conservator of Forests, Federated Malay States at whose request these pests were studied, for the kind assistance afforded me while investigating these diseases.

H. C. PRATT,

Government Entomologist, F. M. S.

TWO ENEMIES OF HEVEA.

In the *Bulletin du department de l'Agriculture aux Indes Neerlandaises* VI p. 46, are described attacks on *Hevea braziliensis* by a Borer, and by Acari, both in the Experimental Gardens of Tjikeumente, in Java. The borer is described as attacking fatally a 7-year old tree. The trunk had lost a portion of its bark and the exposed wood had been pierced by numerous little holes leading to canals, and the bare portion the tissues had developed a thick callus, only one tree had been attacked. No insects were found to which the damage could be attributed, but small beetles and larvæ were found which were considered to be secondary attackers. Near the damaged tree had been some Castilloas destroyed by *Epepscotes luscus* which showed damage similar to that of the Hevea. The description certainly does not agree with that of an attack by *Epepscotes* or any other longicorn beetle which make straight solitary vertical tunnels in the trunk, of considerable size. The account suggests that the borers were *Scolytidæ* attacking wood already killed by some accident, common enough in injured rubber trees, and not necessary fatal. The callusing of the edges of the wound strongly confirms this showing as it does that the damage was of old standing.

The Acari had attacked leaves of seedling Heveas. The leaves became contorted and generally speaking a symmetrical when larger. The quite young leaves did not develop, and the bud seemed swollen, all the plants in the beds were attacked. Under the enfolded edge of the leaf in the under side were numerous acari, of one of which a rough sketch is given. The author points out that when topping the young plants for planting out, the shoots cut off and destroyed will prevent the acari from spreading. The attacks of acari on young plants was pointed out a long time ago by Mr. ARDEN, and probably many of the deformed leaves one sees especially in the nurseries are due to this animal. Flowers of sulphur dusted through the nursery would probably be as good a remedy as anything, but it would certainly be advisable to top the seedlings and burn the toppings.

H. N. R.

BRUCEA SUMATRANA.

This drug seems well to maintain its reputation, although it has not received everywhere the attention it deserves. MONGEOT and MATHIEU in *Nouveaux Remedes* 1906, 22, 386 say, "Kosam seeds or an aqueous alcoholic extract thereof have been employed in the French Colonies with marked success in the treatment of dysentery. The dose is the kernel of one seed or a compressed tablet or dragée of the alcoholic aqueous extract equivalent thereto, four of which are given the first day, eight the second, twelve the third, eight the fourth and one the fifth. Ninety-six per cent of cases treated are stated to have been completely cured." (*Pharm. Journ.* February 2, 1907, p. 104) a good deal has been written in the Bulletin about this drug, the seed of *Brucea Sumatrana*, which has been so well spoken of that one wonders that it has not as yet come into general use for so terrible and common a disease.

H. N. R.

RUBBER FROM A TUBER AT LAST.

A Plant found in Portuguese West Africa, and not hitherto known to science as a source of rubber, is the subject of a recent report by Professor CARLOS EUGENIO DE MELLO GERALDES, of the agronomical institute at Lisbon. The plant is referred to as flourishing in the sandy, treeless plateaus around Bailundo and Bihe, inland from the seaport of Benguela, and lying particularly between the Kwanza and Zambesi rivers. This region was described in *The India Rubber World,* May 1st, 1903, p. 26, as the source of large quantities of "root rubber," which grade has been exported extensively from Benguela, though the plant now described has no relation to those producing the class of rubber here referred to. It is ascribed by Professor J HENRIQUES, of Coimbra, to the natural order *Asclepiadaceae*, while the *Landolphia Thollonii* and other "root rubber" species belong to the *Apocynaceae*. The new plant, known by the natives in different localities as "Ekanda" and "Marianga" is a stemless biennial plant, with a fleshy yellow tubers root, sometimes turnip shaped, but most frequently in form resembling a flattened sphere, the entire substance of which is permeated with latiferous ducts. The plant ends at the top in a simple or bifurcated prolongation or pseudo stem, 2 to 4 inches in length. The leaves are dark green, in two to five pairs forming a rosette near the earth; they are simple, oval shaped, with a small point, and slightly hairy. The featherlike veins are light green in the young leaf, but turn violet-red shortly before blossoming. The blossoms are five fold, small, violet-red, and mostly sterile. In form they suggest a bunch of grapes, and are enclosed in a sheath prior to opening. The fruit is a spindle-shaped bag capsule, sometimes as long as four inches, and containing up to 50 seeds.

Rubber has been obtained from the "Ekanda" tubers by various crude experimental processes, but chiefly by slicing them and applying pressure. The latex is referred to as coagulating with the application of alcohol, but not of alum. It has been suggested that by means of centrifugalization of the expressed juices a creamed latex could be obtained which would yield a purer rubber than has yet resulted from the experiments. Tubers two years old are referred as attaining a diameter of 5½ inches and a weight of 11-3 pounds, and a rubber yield of ½ per cent of the total weight resulted from crude processes. Professor GERALDES, who regards the plant as adapted to cultivation, has figured out estimates of yield and profits, but these must be regarded as yet as hypothetical, and need not be repeated at this time. It may be mentioned, however, that he regards as possible a product of 200 kilgrams of rubber per hectare (–188 pounds per acre) at the end of two years. But his estimate of the value of the rubber (about $1.28 per pound) is clearly too high for the quality likely to be yielded from such a source.

The term "potato rubber," formerly sometimes used in the trade, did not, as some supposed, relate to rubber obtained from a sort of tuber, but to the appearance of the small balls in which certain rubber came to market, particularly "almeidina" a cheap gum exported in small quantities from Portuguese West Africa, but having no relation whatever to the "Ekanda" product.

India Rubber World, 1st *July*, 1907, p. 300.

ESTATE REPORTS.

The following extracts are taken from a Report of the Directors of the Vallambrosa Rubber Company, Limited, Third Ordinary General Meeting of Shareholders dated 8th July 1907. It shows in a most eloquent way the prosperity of our principal industry.

Vallambrosa.

Acreage.—

	Acres.
Rubber in Tapping, 6 years and over	930
,, under 2 years	185½
,, ,, 1 year	15
,, ,, ,, planted through Coconuts and Coffee	78½
Coconuts and Coffee	4¼
Felled and cleared for Rubber	80
Grass and Building Sites	16½
Total ...	1,309¾

Crop.—The amount of rubber harvested during the year was 156,922 lbs., which netted £40,255, or about 5*s.* 1½*d.* per lb. The cost of tapping, packing, and transport was 1*s.* per lb.

The estimated crop of rubber for the current year is 215,000 lbs., while the estimate for the sale of seeds, stumps, coffee and coconuts amounts to £4,709.

Tapping.—The following statement of approximate yield from the older fields is compiled from the Manager's reports.

Acreage of fields.	Distances trees planted apart.	No. of trees tapped.	No. of times tapped.	Yield per tree.	Total yield.	No. of trees per acre tapped.	Yield per acre.	Remarks.
				lbs.	lbs.		lbs.	
60	24′ × 12′	4,642	3	$2\frac{3}{4}$	12,765	77	$212\frac{1}{2}$	Planted 1899 (about 150 trees per acre).
150	10′ × 10′	8,000 28,301	3 2	$1\frac{1}{2}$	54,451	242	363	This field was planted through coffee in 1898, and was thinned out to 260-270 trees per acre.
40	12′ × 10′	6,225	2	1	6,225	155	155	Planted 1900. Thinned to 250 trees per acre.
680	12′ × 10′	10,000 60,820 29,113	3 2 1	1 oz. 5	70,820 9,097	147	$117\frac{1}{2}$	Planted from 1899 to 1901. Thinned to 250-270 trees per acre.
930		147,101			153,358			

The balance of the crop was obtained from trees cut out for thinning.

Owing to prevalence of white ants, and possibility of damage by wind, it has been decided to thin out very gradually.

EXTRACTS FROM REPORT BY MR. R. W. HARRISON.

VALLAMBROSA.

Superintendent—Mr. H. M. Darby.

Visited 3rd May, 1907.

The Estate is in first-rate order, and weeding is well in hand. Along the road frontage, which was bought from natives, weeding still gives a good deal of trouble, and is expensive; but throughout the 930 acres of old rubber there are practically no weeds to be seen.

During the past year the area under rubber has been increased by 78 acres planted among coffee and coconuts along the road frontage. The young rubber all over is coming away well, and the young plants are now well above the coffee.

The clearing along the road on the boundary of Sungei Kapar Estate is even and regular, and trees are thickening out fast. The old rubber all over the Estate is quite healthy and free from pests, with the exception of white ants, which give a great deal of trouble from time to time, and are a constant source of expense.

Unfortunately, a very severe gale of wind struck the Estate about the 18th March, and a number of trees were either blown down or had their tops broken off.

The portions of the Estate—one on the Marshalsea Division, near the A. A. drain, and the other on the Harveston Division—suffered most severely. The damage done is more of a temporary than of a permanent nature, as nearly all the affected trees have been pollarded and put back in their places, and many of them have already begun to sprout.

During the past year about 110 acres have been thinned out to about 150 trees per acre.

Crop.—The year's output of rubber amounted to 156,922 lbs., against an original estimate of 100,000 lbs., which was subsequently increased to 120,000 lbs.

Expenditure.—In last year's Report all charges connected with tapping, curing, etc., were included under one heading; but the actual cost of tapping and collecting scrap for the year amounted to 24·1 cents per lb. (*7d.* per lb.), which I do not consider a high rate when the close planting all over the Estate is taken into consideration, and the comparatively poor yield per tree.

The total cost of rubber produced, allowing for upkeep of land not in bearing, is 61·28 cents per lb., or, say, 1*s.* 5*d.* The estimate of 215,000 lbs. rubber for the present year should be quite safe, unless something unforeseen occurs.

The future prosperity of this Company is now assured; the labour force is well established, and there should be no possibility of any crop being lost owing to lack of coolies to tap. The whole Estate is now opened up, and expenditure on all works should cheapen year by year on weeding owing to the rubber covering the ground more, and on other works owing to the increased yield which may be regularly anticipated for some years to come.

BUKIT KRAIONG.

By the end of June it is anticipated that we shall have planted 320 acres, which will have cost, including all buildings, but deducting land charges, about $73.50, which I consider a very moderate figure for the first clearings in a block situated like this without any road connections or outlets. The land is very good indeed.

TIMES OF MALAYA.

RUBBER SHARE MARKET.

Company.	Closing Quotations.	Capital.	No. of shares.	Issue value.
STERLING.	£	£		£
a Anglo-Malay Rubber Co., Ltd. ...	$4\frac{1}{8}$ sales	150,000	46,500	1
„ „ „ „ ...	$3\frac{1}{2}$ sales	150,000	93,500	p 12/6
Batu Caves Rubber Co., (f. p.) ...	$2\frac{1}{4}$	30,000	7,000	1
„ „ „ „ (Contrib.)	2	....	11,000	p 12/6
b Bukit Rajah Rubber Co., (f. p.)...	$5\frac{3}{8}$	70,000	63,000	1
„ „ „ (Contrib)	$3\frac{3}{4}$	...	7,000	p 15/-
c Cicely Rubber Estates Co., Ltd.	3	12,000	6,000	1
d „ „ 5% Pref. ...	$2\frac{3}{4}$	...	6,000	1
e Consolidated Malay Rubber Ests.	2 13/16	75,000	75,000	1
f Golden Hope Rubber Estate Co.	$1\frac{3}{4}$ sellers	40,000	40,000	1
g Highlands & Lowlands Co. ...	(con.) $1\frac{3}{4}$ bys.	310,000	186,454	1
„ „ „ (Contrib). ...	$1\frac{5}{8}$ buyers	...	123,546	pd 7/6
h Malacca Rubber Plantations Ltd.				
$7\frac{1}{2}$% Pref. ...	20/- sales	300,000	115,000	1
„ „ „ Ord., (f. p.)	18/-	...	110,000	1
„ „ „ (Contrib.)	nominal	...	45,000	pd 2/6
i Pataling Rubber Co. ...	$6\frac{1}{2}$ buyers	30,000	30,000	1
Perak Rubber Plantations Ltd. ...	16/6	75,000	75,000	1
j Selangor Rubber Co., Ltd. ...	$8\frac{1}{8}$ sales *ex.* div.	30,000	30,000	1
S. S. (*Bertam*) Rubber Co., Ltd.	12	175,000	175,000	1
Sungei Way Rubber Co., Ltd. ...	(con.) $1\frac{1}{2}$ bys.	50,000	15,000	1
„ „ „ „ (Con.) ...	15/ pr. sellers	...	35,000	p 10/-
k Vallambrosa Rubber Co., Ltd. ...	$7\frac{3}{8}$ bys. *ex.* div.	60,000	60,000	1
DOLLAR.	$			
Balgownie Rubber Estate (f. p.)	$19\frac{3}{4}$	$200,000	1,700	$108
„ „ „ (Con.)	$17\frac{3}{4}$	...	8,800	10 p
Batu Unjor Rubber Co., Ltd. ...	$20\frac{1}{4}$ sales	700,000	70,000	10
Brieh Rubber Co., Ltd. ...	10	150,000	15,000	10
Castlewood Rubber Co., Ltd. ...	8	150,000	15,000	10
Isseng Rubber Co., Ltd. ...	40 sellers	150,000	1,750	50
l Jebong Rubber Co., Ltd. ...	45	R. 1,200,000	24,000	R. 505
Kalumpong Rubber Co., Ltd. ...	Tls 32 sellers	Tls. 700,000	14,000	50 p 2
Ledbury Rubber Co., Ltd. ...	$ $14\frac{1}{4}$ sellers	$250,000	25,000	10
New Padang Jawa Rubber Co. ...	110 buyers	100,000	1,000	100 p 75
Ribu Planting Co., Ltd. ...	200	200,000	2,000	100
m Sandycroft Rubber Co. ...	310 sales	100,000	1,000	100
Sione Rubber Co., Ltd. ...	14 sales	100,000	10,000	10
Singapore & Johore Rubber Co.	190	250,000	1,000	100
„ „ „ (Con.)	155	...	1,200	pd 65

a 18 per cent. for 1906. *b.* 30 per cent. for 1906. *c.* 15 per cent. year end. 31-3-07. *d.* 20 per cent. year end. 31-3-07. *e.* 10 per cent. for 1906. *f.* 5 per cent. for 1906. *g.* 11 per cent. for 1906. *h.* $7\frac{1}{2}$ per cent. for 1906. *i.* 40 per cent. for 1906. *j.* 40 per cent. for 1906. *k.* 55 per cent. for 1906. *l.* 12 per cent. for 1906. *m.* 20 per cent. year end. 31-1-07.

TEA, COFFEE & RUBBER SHARES.

MONDAY, JULY 1ST, 1907.

INDIAN.	Current Price.	Dividend for 1905.	Dividend for 1906.	Yield per cent. on last full Year's Divd.
AMALGAMATED (£10), fully paid, Ord.	3⅛–3⅜	nil	nil	—
,, 5% Cum. Pref. (£10)	8–8½	(a) 3	5	5½
ANGLO-AMERICAN DIRECT TEA TRADING CO., LTD., Ord. (£10)	5–6	2	2½	5
ANGLO-AMERICAN DIRECT TEA TRADING CO., LTD., 6% Cum. Pref. (£10)	8½–9	6	6	6½
ASSAM CO. (£20)	32–34	8½	8½	4¼
ASSAM FRONTIER Ord. (£10)	9–9½	6	6	6¼
,, 6% Cum. Pref. (£10)	10–10¼	6	6	5⅞
ATTAREE KHAT (£5)	6½–7	8	10	
BAROOARA Ord. (£10)	9–10	4	5	4
,, 5% Cum. Pref. (£10)	8–8½	5	5	6⅔
,, 5% Deb. (£100)	95–100	5	5	5
BENGAL UNITED Ord. (£10)...	10½–11	7½	7½	7
,, 5% Cum. Pref. (£10 ...	8¾–9¼	5	5	5½
BRAHMAPOOTRA (£5)	10½–11	10	14	6
BRITISH INDIAN Ord. (£5)	3–3½	nil	4	5½
,, 5% Cum. Pref. (£5) ...	4½–5½	5	5	4 13/16
CACHAR & DOOARS Ord. (£10)	7–7¼	nil	4	6
,, 6% Cum. Pref. (£10) ...	9–9½	6	6	5½
CHARGOLA Ord. (£1)	1⅛–1 3/16	7	10	5½
,, 7% Cum. Pref. (£1)	1⅛–1¼	7	7	5⅝
CHUBWA Ord. (£5)	7½–8	10	15	9
,, 7% Cum. Pref. (£5)	6¼–6½	7	7	6
CONSOLIDATED Ord. (£10), £10 paid	4½–4¾	—	–	—
,, 5% Cum. 1st Pref. (£10) ...	8½–9	(a) 7	10½	7⅓
,, 7% Cum. 2nd Pref. (£10) ...	11½–12	—	nil	—
,, 4½% Deb.	93–96	4½	4½	5
DARJEELING (£20)	13–14	4½	—	5
DARJEELING Con. Ord. (£10)	4¼–4½	—	nil	—
,, 5% Cum. Pref. (£10)	8¼–8½	5	5	6
DOOARS Ord. (£10)	21–22	12½	20	9
,, 7% Cum. Pref. (£10)	13½–14½	7	7	5
DOOM DOOMA (£10)	16–16½	10	10	5¾
EASTERN ASSAM (£5)	7–7½	6	10	6¼
EMPIRE OF INDIA Ord. (£10)	10–10½	5	10	9½
,, 5% Cum. Pref. (£10) ...	8¾–9	5	5	5½
IMPERIAL TEA Ord. (£10)	7–7½	4	6	7½
,, 5% Cum. Pref. (£10) ...	8¾–9¼	5	5	5½
JOKAI Ord. (£10)	12–12½	7	8	5
,, 6% Cum. Pref. (£10)	12–12½	6	6	4¾
JOREHAUT (£1)	40/–42/	10	12½	6
KANAN DEVAN Ord. (£10 fully paid)	5–6	nil	2	4
,, 6% Cum. Pref. (£10)	8–9	6	6	6⅔
LEBONG (8)	10½–11	10	10	6⅜
LUNGLA Ord. (£10)	8¼–8½	3	—	4
,, 6% Cum. Pref. (£10)	10–10½	6	6	5¾
,, 5% Deb.	99–101	5	5	5
MAKUM (10s.)	⅝–¾	4	7½	6¼
,, 5% Deb.	93–95	5	5	5¼
MAJULI Ord. (£10)	8–8½	5	—	6
,, 6% Cum. Pref. (£10)	10–10½	6	6	5¾

Tea, Coffee & Rubber Shares.—*Continued.*

INDIAN—*Continued.*	Current Price.	Dividend for 1905.	Dividend for 1906.	Yield per cent. on last full Year's Divd.
MOABUND Ord. (£1)	$1\frac{1}{8}$–$1\frac{1}{4}$	6	10	8
„ 5% Cum. Pref. (£1)	$\frac{13}{16}$–$\frac{15}{16}$	5	5	6
„ 5% Deb. (£100)	96–100	5	5	5
NEDEEM, Ord. (£10)	10–$10\frac{1}{2}$	$2\frac{1}{2}$	—	2
„ 5% Cum. Pref. (£10)	$8\frac{1}{2}$–$8\frac{3}{4}$	5	5	$5\frac{3}{4}$
SEPHINJURI BHEEL (5s.) new	$\frac{13}{16}$–$\frac{7}{8}$	25	25	$7\frac{1}{2}$
SINGLO, Ord. (£10)	3–4	—	—	—
„ 6½ non Cum. Pref. (£10)	6–$6\frac{1}{2}$	—	—	—
CEYLON.				
ALLIANCE, Ord. (£10)	$10\frac{3}{4}$–$11\frac{1}{4}$	7	7	$6\frac{1}{2}$
„ 6% Deb.	100–103	6	6	$5\frac{3}{4}$
ANGLO CEYLON, 5% Deb. (£100,000) new ...	98–100	5	5	5
„ Ord. Stock	126–130	6	8	$6\frac{1}{8}$
„ Surplus Certificates	80–85	—	—	—
BANDARAPOLA, Ord. (£10) fully paid	18–20	$7\frac{1}{2}$	$7\frac{1}{2}$	$3\frac{3}{4}$
„ „ (£10) £5 „	8–$8\frac{1}{2}$	$7\frac{1}{2}$	$7\frac{1}{2}$	$4\frac{1}{2}$
„ „ (£10) £5 „ (new) ...	$7\frac{1}{2}$–8	—	$7\frac{1}{2}$	$4\frac{3}{4}$
CEYLON TEA PLANT, Ord. (£10)	$35\frac{1}{4}$–$35\frac{3}{4}$	15	15	$4\frac{1}{4}$
„ 7% Cum. Pref. (£10) ...	15–16	7	7	$4\frac{3}{8}$
CEYLON PROPY., Ord. (£1)	$\frac{1}{2}$–$\frac{5}{8}$	2	nil	—
„ 5% Cum. Pref. (£1)	$\frac{5}{8}$–$\frac{7}{8}$	5	5	6
CONSOLIDATED ESTATES, Ord. (£10)	18–20	8	*4	$4\frac{1}{2}$
„ „ Pref. (£10)	12–13	8	*4	$6\frac{1}{8}$
DIMBULA VALLEY, Ord. (£5)	6–$6\frac{1}{4}$	8	8	$6\frac{1}{2}$
„ 6% Cum. Pref. (£5)	$5\frac{3}{4}$–6	6	6	5
EASTERN PRODUCE, Ord. (£5)	8–$8\frac{1}{4}$	6	$7\frac{1}{2}$	$4\frac{3}{4}$
„ „ 5% Cum. Pref. (£5)	5–$5\frac{1}{2}$	5	5	$4\frac{13}{16}$
NEW DIMBULA (£1)	$3\frac{1}{8}$–$3\frac{3}{8}$	24	—	7
NUWARA ELIYA (£10)	$10\frac{1}{2}$–11	7	7	6
PANAWATTE TEA & RUBBER (£5)	$7\frac{1}{4}$–$7\frac{1}{2}$	—	2	$1\frac{1}{2}$
„ „ (£5) £3 paid ...	1–$1\frac{1}{2}$ pm.	—	2	$1\frac{1}{2}$
STANDARD (£10) £6 paid	13–$13\frac{1}{2}$	15	15	$6\frac{1}{2}$
„ (£10) £10 paid	23–25	15	15	6
YATIYANTOTA, Ord. (£10)	15–$15\frac{1}{2}$	5	5	3
„ 6% Cum. Pref. (£10)	$10\frac{1}{2}$–11	6	6	$5\frac{1}{2}$
COFFEE COMPANIES.				
DUMONT, Ord (£10)	$1\frac{1}{2}$–2	—	—	—
„ 7½% Cum. Pref. (10)	6–7	(*a*) $11\frac{1}{4}$	(*a*) $5\frac{1}{2}$	6
„ 5½% Deb.	98–101	$5\frac{1}{2}$	$5\frac{1}{2}$	$5\frac{1}{2}$
SAN PAULO, 5½% Deb.	98–100	—	—	$5\frac{1}{2}$
RUBBER COMPANIES.				
ANGLO-MALAY, £140,000 Ord. (£1) 12/6 paid ...	$2\frac{7}{8}$–3	—	18	4
„ f.-paid	$3\frac{11}{16}$–$3\frac{13}{16}$	—	18	$4\frac{1}{2}$
BATU CAVES, £11,000 Ord. (£1) 15/- paid ...	$2\frac{1}{4}$–$2\frac{1}{2}$pm.	—	—	—
BUKIT RAJAH, £66,700 Ord. (£1) fully paid ...	$5\frac{1}{8}$–$5\frac{3}{8}$	6	*5	$1\frac{1}{2}$
CONSOLIDATED MALAY, £55,000 (£1) fully paid ...	$2\frac{1}{4}$–$2\frac{3}{8}$	—	10	4
CEYLON COCOA & RUBBER, £15,000 Ord. (£1) ...	$1\frac{1}{2}$–2	—	—	—
CICELY RUBBER ESTATES, £6,000 Ord. (£1) ...	$2\frac{5}{8}$–$2\frac{7}{8}$	5	—	—
„ „ £4,500 5% Pref. (£1) ...	3–$3\frac{1}{4}$	10	—	—
GOLDEN HOPE, £40,000 Ord. (£1)	$1\frac{1}{4}$–$1\frac{3}{8}$	—	5	$3\frac{1}{2}$

Tea, Coffee & Rubber Shares.—*Concluded.*

RUBBER COMPANIES—*Continued.*	Current Price.	Dividend for 1905.	Dividend for 1906.	Yield per cent. on last full Year's Divd.
HIGHLANDS PARA, £181,454 fully paid	$2\frac{7}{16}$–$2\frac{9}{16}$	—	(*g*) 11	8
,, ,, £60,000 Ven. £1.7 6 paid ...	nom.	—	—	—
,, ,, £63,546 quoted £1. 7/6 paid ...	19/0-20/0	pm—	(*g*) 11	6
FED. SELANGOR, £20,000 fully paid	$3\frac{1}{8}$-$3\frac{3}{8}$	—	nil	—
JAVA RUBBER & PRODUCE, £35,000 (£1) 15/- paid ...	par $\frac{1}{16}$ p	m—	nil	—
KLANANG PRODUCE (£20,000)	$4\frac{1}{4}$–$4\frac{1}{2}$	$7\frac{1}{2}$	15	$3\frac{1}{2}$
LINGGI PLANTATION, £19,866 (£1) fully paid ...	$4\frac{3}{8}$–$4\frac{1}{2}$	4	15	$3\frac{1}{2}$
,, ,, £10,000 (£1) 5s. paid ...	$3\frac{1}{4}$–$3\frac{1}{2}$	4	15	$3\frac{1}{2}$
,, ,, £10,000 £1 fully paid 7% Pref.	$1\frac{1}{16}$–$1\frac{3}{16}$	7	7	6
MALACCA RUBBER, £115,000 $7\frac{1}{2}$% c. Pref. (£1) ...	$1\frac{1}{8}$–$1\frac{1}{4}$	$7\frac{1}{2}$	*$3\frac{3}{4}$	6
,, ,, £185,000 Ord. (£1) ...	nom.	—	—	—
MONERAKELLE RUBBER, (£16,400) 12/6 paid ...	par $\frac{1}{8}$ pm	—	—	—
PATALING, £20,000 Ord., £5,000 Mtge. ...	6–$6\frac{1}{2}$	20	40	$5\frac{3}{4}$
SEAFIELD RUBBER, £96,000 7/6 paid	3/0–4/0	pm—	—	—
SELANGOR, £26,300 Ord. (2s.) fully paid ...	$\frac{13}{16}$–$\frac{7}{8}$	(*f*) 20	40	$4\frac{1}{2}$
SHELFORD RUBBER E., £65,000 (£1) fully paid ...	$\frac{7}{8}$–1	—	nil	—
SUNGEI WAY, £41,920 Ord. (£1) 10/- paid ...	$\frac{7}{8}$–1 p	m nil	nil	—
VALLAMBROSA, £50,000 Ord.	$7\frac{1}{4}$–$7\frac{1}{2}$	—	55	7
YAM SENG, £28,600 Ord.	2–$2\frac{1}{4}$	5	—	$2\frac{1}{2}$

* Interim Div. 1906. (*a*) A/c of Arrears. (*c*) Including 1% bonus. (*d*) Including $2\frac{1}{2}$% bonus. (*e*) For year 1903-04. (*f*) Paid in Sungei Way shares. (*g*) For 6 months' working.

GOW, WILSON & STANTON, Ltd.
TEA AND SHARE BROKERS,
13 Rood Lane, London, E. C.

GOW, WILSON & STANTON, LIMITED—
India Rubber Market Report.

13, ROOD LANE, LONDON, E.C.
July 5th, 1907.

At to-day's auction, about 583 packages of Ceylon and Malaya Plantation grown rubber were under offer, of which, only 180 were sold in the room. The total weight amounted to about $30\frac{1}{4}$ tons, Ceylon contributing over 10, and Malaya about $20\frac{1}{4}$ tons.

In sympathy with the Para market, there was a good demand for the finer grades. These changed hands at an advance of from 1*d.* to 2*d.* per lb. on last sale rates.

The highest price in the auction—$5/7\frac{1}{2}$ was realized for a parcel of fine pale worm, while some pale sheet and Ceara biscuits met with keen competition and sold at $5/6\frac{1}{4}$ per lb.

None of the palest crepe was catalogued, but some of the finer parcels were well supported up to $5/3\frac{3}{4}$. The lower grades and unwashed scrap were in rather less demand, a good proportion of these kinds being withdrawn.

As will be seen from the quotations below, the tendency on the part of buyers to pay a premium for the very pale kinds, in whatever form, is becoming more marked, thus showing the importance of care and cleanness in preparation.

TO-DAY'S QUOTATIONS.

SHEET, ETC.

Fine Pale Worm	5/7½
Fine Pale Sheet	5/6¼
Fine Amber Sheet	5/2½ to 5/4¼
Fine Ceara Biscuits	5/6¼
Fine Pale Biscuits	5/4 to 5/5
Fine Biscuits	5/3 to 5/3¾

CREPE.

Fine Pale & Palish	5/2 to 5/3¾
Palish to darkish	4/6¾ to 4/10
Dark	4/4 to 4/4½
Darkish Block	4/7 to 4/10½

UNWASHED SCRAP.

Fine	4/- to 4/1
Fair to medium	3/9 to 3/11
Low	2/-

PLANTATION AVERAGE, AND COMPARATIVE PRICES.

AVERAGE PRICE OF CEYLON AND MALAYA PLANTATION RUBBER.

To-day	180 pkgs.	5/1¼
Corresponding sale last year ...	22 pkgs.	5/8

Plantation.		Hard Fine Para.
Fine.	Scrap.	
5/2½ to 5/7½	3/9 to 4/1	4/8
5/8 to 5/9¼	4/6 to 5/-	5/-

Particulars and prices as follows:—

Ceylon.

Mark	Pkgs.	Description.		Price.
Sorana	11	Biscuits	...	5/3½ to 5/4.
Northumberland	1	,,	...	5/3.
Clara	1	,,	...	5/3.
	1	Scrap	...	3/10.
Waharaka	2	Dark biscuits	...	5/2 & 5/3½.
	2	Scrap	...	4/-.
Ballacadua	1	Black crêpe	...	bought in.
K M	1	Lumps	...	bought in.
	1	Scrap	...	bought in.
	1	Crêpe	...	bought in.
	1	Scrap	...	bought in.
Dolahena	2	Dark sheet	...	5/2¾.
Doranakande	3	Biscuits	...	5/3½.
	2	Good pressed scrap	...	4/-.
	1	Darker	...	3/11.
	3	Rejections	...	bought in.
Arapolakande	6	Fine biscuits	...	5/5.
	2	Good ,,	...	5/4.
	2	Good scrap	...	4/1.
	1	Dark ,,	...	bought in.
	1	Dark block	...	3/8.
Ingoya	3	Fine pressed sheet	...	5/3.
	1	Barky scrap	...	2/-
Langsland	12	Biscuits	...	5/4½.
Heatherley	4	Pressed crêpe	...	4/5¾.
Culloden	8	,, ,,	part sold,	4/6¾.
Ellakande	1	,, ,,	...	4/4½.
Nikakotua	3	Dark pressed crêpe	...	4/4.
J J V & Co.	3	Dark block	...	bought in.
	3	Blocked crêpe	...	bought in.
	2	Rambong	...	bought in.
	1	Dark pressed crêpe	...	bought in.
J J V & Co.	1	Blocked crêpe	...	bought in.
A	4	Lumps	...	bought in.
	2	Rejections	...	bought in.
	1	Blocked scrap	...	bought in.
Gikiyanakande	5	Fine pale worm	...	5/7½.
	3	Darkish and dark rolled crêpe	...	4/5 to 4/5¾.
Kipitiagalla	33	Sheet	part sold,	5/3¾.
	3	Rejected sheet & biscuits		bought in.
	2	Lumps	...	bought in.
	2	Pressed scrap	...	bought in.
Suduganga	2	Rough biscuits	...	5/3.
Old Haloya	1	Fine ,,	...	5/5½.

Mark.	Pkgs.	Description.	Price.
NR	33	Crêpe	bought in.
	1	Rejected biscuits	bought in.
	1	Scrap	bought in.
	1	Block	bought in.
	17	Crêpe	bought in.
	2	Crêpe	bought in.
	1	Lump scrap	bought in.
A | R / P | C	3	Whitish blocked crêpe	bought in.
Weoya	1	Fine blocked sheet	5/3¾.
Polatagama	3	Biscuits	5/- to 5/3½.
	1	Cuttings	bought in.
Tudugalla	5	Darkish & dark block	bought in.
Elston	1	Biscuits	5/3½.
Ross	1	,,	5/3¾.
	2	Scrap	3/11.

MALAYA.

Mark.	Pkgs.	Description.	Price.
C M R E Ld.	32	Good to fine crêpe	bought in.
Shelford	2	Sheet	5/3.
	6	Block	bought in.
B & D	8	Good sheet	5/3¼ to 5/3½.
	1	Dark pressed crêpe	bought in.
	1	Sheet	bought in.
	1	Lace	bought in.
	2	Rejections and scrap	bought in.
	1	Good crêpe	bought in.
	1	Sheet	bought in.
	1	Crêpe	bought in.
E K K P	2	Fine Sheet	5/3½.
	1	Ball scrap	3/11.
	1	Rejections	3/9.
B M & Co.	5	Good sheet	5/2½ to 5/3¼.
	1	Scrap	3/9.
	1	Rejections	3/6.
	2	Very fine sheet	5/6¼.
	1	Good scrap	4/1.
	1	Sheet	5/3½.
	1	Rejections	3/6¼.
H	10	Rambong	bought in.
Damansara	11	Good block	bought in.
	1	Crêpe	5/2.
	6	Darkish and dark block	5/2.
L E Muar Straits	18	Good greyish block	bought in.

Mark.	Pkgs.	Description.		Price.
SP S	1	Scrap	...	bought in.
K	8	Good crêpe	...	pt. sold, 4/4.
V R Co Ld. Klang FMS	40	Good crêpe	...	bought in.
	2	Palish block	...	bought in.
	38	Dark ,,	...	bought in.
R S R	10	Sheet	...	5/3½.
P S E	3	Dark block	...	pt. sold, 3/10.
	1	Palish pressed crêpe	...	bought in.
	1	Dark ,, ,,	...	bought in.
T E A, Etc.	29	Good crêpe	...	bought in.
C	28	Darker	...	pt. sold, 4/8.
	1	Pressed crêpe	...	bought in.
Pataling	10	Crêpe	...	bought in.
A M R C	5	Crêpe and rejections	...	bought in.
SSBRCoLd.	6	Sheet	...	5/3¾.
	4	Crêpe	...	bought in.
	1	Block	...	bought in.
M	5	Sheet	...	5/3½.
B R R Co. Ld.	7	Good to fine crêpe	...	5/3 to 5/3½.
	13	Dark block	...	bought in.
	2	Darker	...	bought in.
Highlands	25	Sheet	...	5/4 to 5/4¼.
	8	Darkish block	...	pt. sold, 4/7. to 4/10½.

Lewis and Peat's Ceylon, Straits and Malay States Plantation Rubber Report.

July 5th, 1907.

The following Lots, comprising about 10 Tons Ceylon and 20 Tons Straits, were offered at auctions to-day, and sold as follows:—

Straits and Malay States.

Mark.	Pkgs.		Description.		Price.
F D P B & D	6	Cases	Palish and darkish sheets	...	5/3¼ @ 5/3½.
	1	,,	Palish and darkish sheets, dull	...	5/3½.
	1	,,	Fine amber sheets	...	bought in.
	1	,,	Pressed black and white crêpe	...	bought in.
	1	Bag	Lace scrap	...	bought in.
B & D	1	Case	Palish and mottled crêpe	...	bought in.
	1	,,	Small amber sheets, dull	...	bought in.

Mark.	Pkgs.		Description.	Price.
E K K P	2	,,	Pale and darkish sheets ...	5/3½.
	1	,,	Ball scrap ...	3/11.
	1	,,	Amber and darkish sheets ...	5/3.
B M & Co. P	1	,,	Amber and darkish sheets, not perfectly dried ...	5/2½.
	1	Bag	Brown and white scrap and pieces ...	3/9.
B M & Co. P P	3	Cases	Thin dull amber sheets ...	5/3¼.
B M & Co. S	1	,,	Virgin biscuits and scrap ...	3/6.
B M & Co. P	2	,,	Pale sheets, some little stained ...	5/6¼.
B M & Co. P S	1	,,	Good brown scrap ...	4/1.
	1	Bag	Pale amber sheets, mouldly and stained ...	5/3½.
Damansara Selangor	11	Cases	Good clean brown pressed crêpe ...	bought in.
	1	,,	Good amber crêpe ...	5/2.
	5	,,	Dark brown pressed crêpe ...	bought in.
	1	,,	Black run crêpe ...	bought in.
L E Muar Straits	18	,,	No. 2 block ...	bought in.
C M R E Ld.	5	,,	Good pale crêpe ...	bought in.
	2	,,	Pale and mottled crêpe ...	bought in.
	13	,,	Pale and dark mottled crêpe ...	bought in.
	12	,,	Dark mottled crêpe ...	bought in.
Shelford	2	,,	Large dullish sheets ...	5/3.
	(2)	,,	Black block ...	bought in.
	(4)	,,	Black block ...	bought in.
K	6	,,	Good darkish crêpe ...	bought in.
	1	,,	Dark crêpe ...	4/4.
V R Co Ld. Klang F M S	32	,,	Good darkish crêpe ...	bought in.
	8	,,	Darkish and mottled crêpe, slightly heated ...	bought in.
	2	,,	Wet block ...	bought in.
	34	,,	Black and brown blocked crêpe ...	bought in.
S R R	10	,	Large amber sheets ...	5/3½.
P S E	1	,	Black blocked crêpe subject ...	3/10.
	2	,,	Brown blocked crêpe ...	bought in.
	1	,,	Wet block ...	bought in.
T E A	9	,,	Good pale crêpe ...	bought in.
L E A	3	,,	Good pale crêpe, some mottled ...	bought in.
G H	4	,,	Good palish crêpe ...	5/1¼ bid.
Etc.	4	,,	Darkish crêpe ...	4/6 bid.
L E A	5	,,	Palish crêpe ...	5/2¼ bid.
	4	,,	Grey crêpe ...	bought in.
	2	,,	Dark crêpe ..	bought in.
Pataling	2	,,	Mottled crêpe ...	bought in.
T E A	6	,,	Palish and grey crêpe ...	4/8 bid.
	3	,,	Darkish crêpe ...	4/6 bid.
	9	,,	Mottled crêpe 2 cases sold ...	4/8.
	8	,,	Mottled crêpe, slightly heated ...	bought in.

Mark.	Pkgs.	Description.	Price.
Pataling	8 Cases	Brown crêpe	4/5½ bid.
A M R C	4 ,,	Brown crêpe	bought in.
M	5 ,,	Amber biscuits	5/3½.
B R R Co. Ld.	7 ,,	Good pale crêpe	5/3 @ 5/3½.
	13 Pkgs.	Black blocked crêpe	bought in.
	2 Cases	Black blocked crêpe, rather heated	bought in.
Highland	25 ,,	Rolled sheets	5/4 @ 5/4¼
Estates	5 ,,	Blocked mottled crêpe	4/7 @ 4/10½
	2 ,,	Dark mottled crêpe	bought in.
	1 ,,	Brown mottled crêpe	bought in.

Ceylon.

Sorana	2 ,,	Fine pale and amber biscuits	5/4.
	4 ,,	Dullish biscuits	5/3¾.
Northumberland	1 ,,	Dullish amber biscuits, rather resinous	5/3.
Clara	1 ,,	Dullish amber biscuits, rather resinous	5/3.
	1 ,,	Brown pressed scrap	3/10.
Waharaka	1 ,,	Dull dark biscuits	5/2.
	2 ,,	Dark brown scrap	4/-.
Ballacadua	1 ,,	Black crêpe	bought in.
Dolahena	2 ,,	Very dark sheets	5/2¾.
Sorana	1 ,,	Fine pale and amber biscuits	5/3½.
	4 ,,	Good pale and amber biscuits	5/3½.
Doranakande	3 ,,	Dullish amber biscuits	5/3½.
	3 ,,	Brown pressed scrap	4 -.
	3 ,,	Scrap and pieces	3/9 @ 3/11.
Waharaka	1 ,,	Dull brownish biscuits	5 3½.
Arapolakande	5 ,,	Fine pale biscuits	5/5.
	2 ,,	Dark biscuits	5/4.
	1 ,,	Fine pale biscuits	5/5.
	2 ,,	Good brown scrap	4/1.
	1 ,,	Dark scrap	3/7 bid.
	1 ,,	Brown crêpe	3/8.
Ingoya	3 ,,	Fine block	5/3.
	1 ,,	Black low scrap	2/-.
Langsland	12 ,,	Good amber biscuits	5/4½.
Heatherley	4 ,,	Brown pressed crêpe	4/5¾.
Culloden	6 ,,	Brown pressed crêpe	4/6¾.
	2 ,,	Black pressed crêpe	bought in.
Ellakande	1 ,,	Brown pressed crêpe	4/4½.
Nikakotua	3 ,,	Brown pressed crêpe	4/4.
Gikiyanakande	5 ,,	Fine pale worms	5/7½.
	3 ,,	Brown pressed crêpe	part sold 4/5 @ 4/5¾.
Kepitigalla	33 ,,	Dark amber sheets	5 cases sold 5/3¾.
	3 ,,	Rough mouldy biscuits and sheets	bought in.
	2 ,,	Nuggets	3/11 bid.
Suduganga	2 ,,	Small dark biscuits	5 3.
A | R / P | C	3 Bales	White pressed crêpe	bought in.
N R	17 Cases	Darkish mottled crêpe	bought in.
	2 ,,	Brown crêpe	bought in.
Weoya	1 ,,	Good blocked sheets	5/3¾.
Polatagama	3 ,,	Small darkish biscuits, some rather rough	5/- @ 5/3¼.
	1 ,,	Black nuggety scrap	bought in.

Mark.	Pkgs.	Description.		Price.
Tudugalla	3 Cases	Brown pressed crêpe	...	bought in.
	2 ,,	Black pressed crêpe	...	bought in.
Elston	1 ,,	Very mixed biscuits	...	5/3½.
Ross	1 ,,	Amber and darkish biscuits	...	5 3¾.
	1 ,,	Brown scrap	...	3 11.
Old haloya	1 ,,	Small pale biscuits	...	5/6½.
		WEST INDIAN.		
L & P	1 ,,	Black scrap	...	3/11.
R	1 Bag	Good black castilloa sheets	...	4 -.
	1 Case	Black scrap, heated	...	3 9.

TEA, COFFEE & RUBBER SHARES.

MONDAY, JULY 8TH, 1907.

INDIAN.	Current Price.	Dividend for 1905.	Dividend for 1906.	Yield per cent. on last full Year's Div.
AMALGAMATED (£10), fully paid, Ord.	3⅛–3⅜	nil	nil	—
,, 5% Cum. Pref. (£10)	8–8½	(*a*) 3	5	5½
ANGLO-AMERICAN DIRECT TEA TRADING CO., LTD., Ord. (£10)	5½–6	2	2½	5
ANGLO-AMERICAN DIRECT TEA TRADING CO., LTD., 6% Cum. Pref. (£10)	8¾–9	6	6	6½
ASSAM CO. (£20)	32–34	8½	8½	4¼
ASSAM FRONTIER Ord. (£10)	9–9½	6	6	6¼
,, 6% Cum. Pref. (£10) ...	10–10¼	6	6	5⅞
ATTAREE KHAT (£5)	6½–7	8	10	7
BAROOARA Ord. (£10)	9–10	4	5	4
,, 5% Cum. Pref. (£10)	8–8½	5	5	6⅔
,, 5% Deb. (£100)	95–100	5	5	5
BENGAL UNITED Ord. (£10)	10½–11	7½	7½	7
,, 5% Cum. Pref. (£10)	8¾–9¼	5	5	5½
BRAHMAPOOTRA (£5)	10½–11	10	14	6
BRITISH INDIAN Ord. (£5)	3–3½	nil	4	5½
,, 5% Cum. Pref. (£5)	4½–5½	5	5	$4\frac{13}{16}$
CACHAR & DOOARS Ord. (£10)	7¼–7½	nil	4	6
,, 6% Cum. Pref. (£10) ...	9–9½	6	6	5½
CHARGOLA Ord. (£1)	$1\frac{1}{8}$–$1\frac{3}{16}$	7	10	5½
,, 7% Cum. Pref. (£1)	1⅛–1¼	7	7	5⅝
CHUBWA Ord. (£5)	7½–8	10	15	9
,, 7% Cum. Pref. (£5)	6¼–6½	7	7	6
CONSOLIDATED Ord. (£10), £10 paid	4½–4¾	—	—	—
,, 5% Cum. 1st Pref. (£10)	8½–9	(*a*) 7	10½	7⅓
,, 7% Cum. 2nd Pref. (£10) ...	11½–12	—	nil	—
,, 4½% Deb.	93–96	4½	4½	5
DARJEELING (£20)	13–14	4½	—	5
DARJEELING Con. Ord. (£10)	4¼–4½	—	nil	—
,, 5% Cum. Pref. (£10)	8½–9	5	5	6
DOOARS Ord. (£10)	21–22	12½	20	9
,, 7% Cum. Pref. (£10)	13½–14½	7	7	5
DOOM DOOMA (£10)	16–16½	10	10	5¾
EASTERN ASSAM (£5)	7–7½	6	10	6¼
EMPIRE OF INDIA Ord. (£10)	10–10½	5	10	9½
,, 5% Cum. Pref. (£10)	8¾–9	5	5	5½
IMPERIAL TEA Ord. (£10)	7–7½	4	6	7½
,, 5% Cum. Pref. (£10)	8¾–9¼	5	5	5½
JOKAI Ord. (£10)	12–12½	7	8	5
,, 6% Cum. Pref. (£10)	12–12½	6	6	4¾
JOREHAUT (£1)	40/–42/	10	12½	6
KANAN DEVAN Ord. (£10, fully paid)	5–6	nil	2	4
,, 6% Cum. Pref. (£10)	8–9	6	6	6⅔
LEBONG (£8)	10½–11	10	10	6⅜
LUNGLA, Ord. (£10)	8¼–8½	3	—	4
,, 6% Cum. Pref. (£10)	10–10½	6	6	5¾
,, 5% Deb.	99–101	5	5	5
MAKUM, (10s.)	$\frac{9}{16}$–⅝	4	7½	6¼
,, 5% Deb.	93–95	5	5	5¼
MAJULI Ord. (£10)	8–8½	5	6	7
,, 6% Cum. Pref. (£10)	10–10½	6	6	5¾
MOABUND Ord. (£1)	1⅛–1¼	6	10	8

Tea, Coffee & Rubber Shares.—*Continued.*

INDIAN.—*Continued.*	Current Price.	Dividend for 1905.	Dividend for 1906.	Yield per cent. on last full Year's Div.
MOABUND 5% Cum. Pref. (£1)	$\frac{13}{16}$–$\frac{15}{16}$	5	5	6
,, 5% Deb. (£100)	96–100	5	5	5
NEDEEM, Ord. (£10)	10–10½	2½	—	2
,, 5% Cum. Pref. (£10)	8½–8¾	5	5	5¾
SEPHINJURI BHEEL (5s.) new	$\frac{13}{16}$–⅞	25	25	7½
SINGLO, Ord. (£10)	3–4	—	—	—
,, 6½ non Cum. Pref. (£10)	6–6½	—	—	—
CEYLON.				
ALLIANCE, Ord. (£10)	10¾–11¼	7	7	6½
,, 6% Deb.	100–103	6	6	5¾
ANGLO CEYLON, 5% Deb. (£100,000) new ...	98–100	5	5	5
,, Ord. Stock	126–130	6	8	6⅛
,, Surplus Certificates	80–85	—	—	—
BANDARAPOLA, Ord. (£10) fully paid	18–20	7½	7½	3¾
,, ,, (£10) £5 ,, ...	8–8½	7½	7½	4½
,, ,, (£10) £5 ,, (new) ...	7½–8	—	7½	4¾
CEYLON TEA PLANT, Ord. (£10)	35¼–35¾	15	15	4¼
,, 7% Cum. Pref. (£10)	15–16	7	7	4⅜
CEYLON PROPY., Ord (£1)	½–⅝	2	nil	—
,, 5% Cum. Pref. (£1)	⅝–⅞	5	5	6
CONSOLIDATED ESTATES, Ord. (£10)	18 20	8	*4	4½
,, ,, Pref. (£10)	12–13	8	*4	6⅛
DIMBULA VALLEY, Ord. (£5)	6–6¼	8	8	6½
,, 6% Cum. Pref. (£5)	5¾–6	6	6	5
EASTERN PRODUCE, Ord. (£5)	8¼–8½	6	7½	4¾
,, 5% Cum. Pref. (£5)	5–5½	5	5	4$\frac{13}{16}$
NEW DIMBULA, (£1)	3⅛ 3⅜	24	—	7
NUWARA ELIYA, (£10)	10½–11	7	7	6
PANAWATTE T & RUBBER, (£5)	7¼–7½	—	2	1½
,, ,, (£5) £3 paid ...	1–1½pm	—	2	1½
STANDARD, (£10) £6 paid	13–13½	15	15	6½
,, (£10) £10 paid	23–25	15	15	6
YATIYANTOTA, Ord. (£10)	15–15½	5	5	3
,, 6% Cum. Pref. (£10)	10½–11	6	6	5½
COFFEE COMPANIES.				
DUMONT, Ord. (£10)	1½–2	—	—	—
,, 7½% Cum. Pref. (£10)	6–7	(*a*) 11¼	(*a*) 5½	6
,, 5½% Deb.	98–101	5½	5½	5½
SAN PAULO, 5½% Deb.	98–100	—	—	5½
RUBBER COMPANIES.				
ANGLO-MALAY, £140,000 Ord. (£1) 15/- paid ...	3–3¼	—	18	4
,, f.-pd.	3$\frac{11}{16}$–3$\frac{13}{16}$	—	18	4½
BATU CAVES, £11,000 Ord. (£1) 15/- paid ...	2½–2⅝ p m	—	—	—
BUKIT RAJAH, £66,700 Ord. (£1) fully paid ...	5⅝–5⅞	6	30	5½
CONSOLIDATED MALAY, £55,000 (£1) fully paid ...	2⅜ 2⅝	—	10	4
CEYLON COCOA & RUBBER, £15,000 Ord. (£1) ...	1½–2	—	—	—
CICELY RUBBER ESTATES, £6,000 Ord. (£1) ...	2⅝–2⅞	5	—	—
,, ,, ,, £4,500 5% Pref. (£1) ...	3–3¼	10	—	—

Tea, Coffee & Rubber Shares.—*Concluded.*

RUBBER COMPANIES.—*Continued.*		Current Price.	Dividend for 1905.	Dividend for 1906.	Yield per cent. on last full Year's Div.
GOLDEN HOPE, £40,000 Ord. (£1) ...	...	$1\frac{1}{4}$–$1\frac{3}{8}$	—	5	$3\frac{1}{2}$
HIGHLANDS PARA, £181,454 fully paid ...	...	$2\frac{9}{16}$–$2\frac{11}{16}$	—	(*g*) 11	8
,, ,, £60,000 Ven. £1,7/6 paid	...	nom.	—	—	—
,, ,, £63,546 qtd , £1,7/6 paid	...	19/0-20/0 pm	—	(*g*) 11	6
FED. SELAN. £20,000 fully paid ...	...	$3\frac{1}{8}$–$3\frac{3}{8}$	—	nil	—
JAVA RUBBER & PRODUCE, £35,000 (£1) 15/- paid	...	par $\frac{1}{16}$ pm	—	nil	—
KLANANG PRODUCE (£20,000) ...	...	$4\frac{1}{2}$–$4\frac{3}{4}$	$7\frac{1}{2}$	15	$3\frac{1}{2}$
LINGGI PLANTATION, £19,866, (£1) fully paid	...	$4\frac{3}{8}$–$4\frac{1}{2}$	4	15	$3\frac{1}{2}$
,, ,, £10,000, (£1) 5s. paid	...	$3\frac{1}{4}$–$3\frac{1}{2}$	4	15	$3\frac{1}{2}$
,, ,, £10,000, £1 f. pd., 7% Pref.	...	$1\frac{1}{16}$–$1\frac{3}{16}$	7	7	6
MALACCA RUBBER, £115,000 $7\frac{1}{2}$% c pf., (£1)	...	$1\frac{1}{8}$–$1\frac{1}{4}$	$7\frac{1}{2}$	*$3\frac{3}{4}$	6
,, ,, £185,000, Ord. (£1)	...	nom.	—	—	—
MONERAKELLE RUBBER, (£16,400) 12/6 paid	...	par $\frac{1}{8}$ pm	—	—	—
PATALING, £20,000 Ord , £5,000 Mtge.	...	6–$6\frac{1}{2}$	20	40	$5\frac{3}{4}$
SEAFIELD RUBBER, £96,000 7/6 paid ...	...	3/0–4/0 pm	—	—	—
SELANGOR, £26,300 Ord. (2s.) fully paid	...	$\frac{13}{16}$–$\frac{7}{8}$	(*f*) 20	40	$4\frac{1}{2}$
SHELFORD RUBBER ESTATES, £65,000 (£1) f. pd.	...	$\frac{7}{8}$–1	—	nil	—
SUNGEI WAY, £41,920 Ord. (£1) 12/6 paid	...	$\frac{7}{8}$–1 pm	nil	nil	—
VALLAMBROSA, £50,000 Ord. ...	...	$7\frac{1}{4}$–$7\frac{1}{2}$	—	55	7
YAM SENG, £28,600 Ord. ...	...	2–$2\frac{1}{4}$	5	—	$2\frac{1}{2}$

* Interim Div. 1906. (*a*) A/c of Arrears. (*c*) Including 1% bonus. (*d*) Including $2\frac{1}{2}$% bonus. (*e*) For year 1903/4. (*f*) Paid in Sungei Way Shares. (*g*) For 6 months' working.

Malacca.

Abstract of Meteorological Readings for the month of June, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Durian Daun Hospital	Not Registered.	147·6	80·2	88·7	73·3	15·3	81·3	1·056	69·6	93	N.W.	12·37	3·10

Colonial Surgeon's Office,
Malacca, 22nd July, 1907.

F. B. CROUCHER,
Colonial Surgeon, Malacca.

Selangor.

Abstract of Meteorological Readings in the various Districts of the State for the month of June, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature. Mean Dry Bulb.	Temperature. Maximum.	Temperature. Minimum.	Temperature. Range.	Hygrometer. Mean Wet Bulb.	Hygrometer. Vapour Tension	Hygrometer. Dew Point.	Hygrometer. Humidity.	Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
General Hospital, Kuala Lumpur	29·883	147·6	80·3	90·0	71·1	18·8	76·1	0·819	73·2	78	S W.	7·44	3·56
Pudoh Gaol Hospital ,, ...	...	...	...	...	...	...	...	...	...	...	...	8·91	1·88
District Hospital ,, ...	...	...	...	...	...	...	...	...	...	...	...	5·42	1·70
,, Klang	...	...	...	89·2	71·5	17·7	...	...	...	...	...	7·22	1·86
,, Kuala Langat	...	...	...	...	...	...	...	...	...	...	...	3·00	1·35
,, Kajang	...	...	...	88·1	76·1	12·0	...	...	...	...	...	3·90	0·79
,, Kuala Selangor	...	...	...	...	...	...	...	...	...	...	...	7·96	1·26
,, Kuala Kubu	...	...	...	...	...	...	...	...	...	...	...	11·59	3·00
,, Serendah	...	...	...	...	...	...	...	...	...	...	...	11·12	3·69
,, Rawang	...	...	...	90·6	71·4	19·2	...	...	...	...	...	9·83	3·40
Beri-beri Hospital, Jeram	...	...	...	...	...	...	...	...	...	...	...	6·96	1·24
Sabah Bernam	...	...	...	...	...	...	...	...	...	...	..	5·93	1·62

STATE SURGEON'S OFFICE,
KUALA LUMPUR, 22nd *July*, 1907.

A. J. McCLOSKY,
Acting State Surgeon, Selangor.

The Duff Development Company, Limited, Kelantan.

Abstract of Meteorological Readings for the month of June, 1907.

District.	Temperature.			Rainfall.	
	Maximum.	Minimum.	Range.	Total Rainfall.	Greatest Rainfall during 24 hours.
	Mean. °F	Mean. °F	Mean. °F	Inches.	Inches.
Kuala Lebir ...	87·7	71·2	16·5	6·74	1·07
Kuala Kelantan ...	86·6	73·7	13·0	4·12	·83
Serasa ...	92·0	71·2	21·4	10·26	2·61

SURGEON'S OFFICE,

KUALA LEBIR, *12th July*, 1907.

A. FREDERICKS,

Dresser in Charge.

AGRICULTURAL BULLETIN

OF THE

STRAITS

AND

FEDERATED MALAY STATES.

No. 9.] SEPTEMBER, 1907. [Vol. VI.

REPORT OF THE DIRECTOR OF AGRICULTURE F. M. S., FOR THE YEAR 1906.

The second year's record of the Department of Agriculture, Federated Malay States, is like the first annual report to a great extent an account of the work of organisation and equipment. The department still suffers from lack of suitable quarters, and the year's work was carried on under difficulties owing to want of necessary accommodation and also to the fact that the offices of the officials of the department were some miles apart. This inconvenience will shortly be removed, when the laboratories and office buildings of the department, now being built at the Swettenham Road Experiment Plantations, are completed.

A great deal of scientific work having an important practical bearing on the various agricultural industries of the Peninsula had to be either investigated cursorily or postponed. With only one scientific worker to undertake the investigation of problems of plant disease, chemistry, meteorology, etc., and at the same time to carry on a large number of routine duties as Director of Agriculture, this was unavoidable.

During the latter part of the year a Government Chemist and an Entomologist were appointed, attached to the Institute for Medical Research, and the technical knowledge of these officials was to some extent placed at the disposal of the Department of Agriculture. The Chemist, however, had a large amount of Public Analyst's work to overtake, and consequently was only able to do agricultural work of the most pressing character. His report in regard to this latter work is appended.

The Entomologist, who arrived in September, was able to devote more time but had in addition to his agricultural disease preventive work to carry on investigations in medical pathology and therapeutics.

With the large amount of useful work, both chemical and entomological, which lies to hand in agriculture in this country, the Department of Agriculture cannot be considered as adequately equipped for its work until it has its own technical officers to devote themselves to the problems on which knowledge must be gained before progress can be made. A step in this direction has been definitely taken, and a Government Mycologist, Mr. W. J. GALLAGHER, M.A., a distinguished student of plant pathology, has been appointed and will take up his duties early in 1907.

The compilation of statistics relating to agriculture has been begun by the department as will be seen by the tables which are published in this report. Every effort has been made to make the figures accurate and dependable, but with a rapidly growing industry like rubber, and with a scattered native cultivation like coconut plantations, absolute accuracy is almost too much to hope for. The error may, however, be considered to be very slight, probably 5 per cent. at the outside, and it is not unlikely that as errors exist both in exaggeration and understating, that the figures given may be the mean.

SOILS AND THEIR ANALYSIS.

The subject of the physical and chemical properties of soils is, in an agricultural country, always of much interest and importance.

Recent investigations have shown that there is another factor in the relative qualities of soils which is of equal or perhaps greater importance than the chemical and physical composition, and that factor is the biological condition of the soil. The abundance or deficiency of nitrifying bacteria or bacilli very largely influences the amount of plant food available in the soil. The investigation of soils from this point of view is a branch of science which is in its infancy, and methods have not as yet been invented which allow of comparatively rapid tests being made.

A soil bacteriological laboratory has been initiated by Dr. TREUB, the creator and Director of the Java Agricultural and General Science Investigation Station. From the work carried on in this new laboratory knowledge will be gained of great benefit to agriculture in Malaya.

Biological investigation of local soils here will be carried on in the laboratories of the Department of Agriculture, Federated Malay States, when they are completed.

Mr. M. KELWAY BAMBER, F.I.C., F.C.S., Government Chemist of Ceylon, and a well-known authority in tropical agriculture, during the past year paid a second visit to the Federated Malay

States, and has been kind enough to furnish me with the following remarks on the soils and a most interesting table of analyses of typical soils taken from different rubber districts :

" The soils of Malaya are not specially rich in plant food but their physical characters are exceptionally good, and this together with the unequalled climate for plant growth constitute conditions for the vigorous growth of rubber and other crops not to be found elsewhere.

Typical Soils of Malay States.

" The soils may be roughly divided into two distinct kinds :

" A. The flat alluvial clays or muds on the banks of rivers and near the sea coast.

" B. The undulating low soils a few miles inland, where they vary from free sandy loams to heavy clays.

" Peaty soils on clay usually lying a few miles from the coast.

" The alluvial clays or muds are in an exceedingly fine state of division, about 96 per cent. passing through a mesh of 8,100 per square inch, and the balance through a mesh of 3,600 per square inch.

" Although having the appearance of fine clays there is very little alumina present, the bulk of the soil being composed of very finely divided sand and insoluble silicates. When wet they are compact and greasy, but on drying they break up into comparatively free loams, through which roots can permeate freely, so that, unless liable to flooding with salt water, they are all well suited for the growth of para rubber, coconuts and liberian coffee.

" The amount of organic matter in these soils varies considerably from 8 to 35 per cent., or even more if the surface layer is at all peaty. They are generally very rich in nitrogen, containing from 0.4 to 0.9 per cent. on the air-dried soil ; a soil with 0.2 per cent. being considered rich in other countries.

" With regard to the mineral matter, which forms the ash of the plants, they are not so rich ; although the exceedingly fine state of division of the soils renders a high proportion less necessary. They are more or less deficient in lime, which accounts for the markedly acid character of the soils when first opened ; the acidity is neutralised to some extent by ash from the burnt forest, but it also gradually diminishes as the drainage water is removed to a lower level and the soil becomes aerated.

" Magnesia is present in ample quantity in most cases.

" POTASH, one of the chief mineral constituents required for plant growth, is frequently deficient, though a few of the river deposits are rich in this constituent, and the subsoil is usually richer than the surface soil especially if of a clayey nature.

" The proportion of phosphoric acid is also variable, ranging from 0.012 to 0.13, the average being about 0.76 per cent. on the air-dried soil.

" All this class of soil requires very efficient drainage as it has often been more or less under water for years, so that air has been excluded, resulting in a rather high proportion of the lower oxide of iron, which in excess is poisonous to many cultivated plants. The vigorous growth of rubber on this class of soil after drainage is unequalled elsewhere during the first years of growth.

" UPLAND SOILS.—These soils have a larger proportion of sand and coarser particles in their composition which renders them more open, and drainage, except for saving wash, less necessary.

" They are richer in nitrogen than the proportion of organic matter would indicate, but are usually a little deficient in total potash and to some extent in phosphoric acid.

" Their free character and suitability for root growth makes the proportion of these constituents ample for present requirements, and it is evident from the growth of Para on these soils that there is no deficiency in any respect.

"CHEMICAL AND PHYSICAL ANALYSIS OF FEDERATED MALAY STATES SOILS.

MECHANICAL COMPOSITION.

	Mechanical Composition.									
	Alluvial Clays.			Sandy Loams.						
	%	Subsoil %	%	%	%	%	%	%	%	%
Fine soil passing 90 mesh	96.00	95.50	68.00	32.00	48.00	30.00	36.00	26.00	16.00	30.00
,, 60 ,, ...	4.00	4 50	32.00	34.00	36.00	34.00	38.00	30.00	24.00	30 00
Medium soil passing 30 mesh	..	..	..	12.00	12.00	26.00	8.00	22.00	28.00	14.00
Coarse sand and small stones	..	..	..	22.00	4.00	10.00	18.00	22.00	32.00	26.00
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	CHEMICAL COMPOSITION.									
Moisture	6.920	5.560	5.000	4.200	2.000	1.400	4.000	2 200	2.600	1.800
Organic matter and combined water	24.080	16.640	8.000	9.000	4.400	3.000	9.600	5.600	6.000	9 200
Oxide of iron and manganese	1.120	1.200	3.000	1,500	2.400	0.300	8.240	0.700	0,300	4.000
,, ,, alumina..	2.971	3.019	2.520	5.690	1.855	1.165	4.183	2.516	2.958	4.951
Lime	0.284	0.200	0.160	0.200	0.160	0.140	0.160	0.160	0.140	0.240
Magnesia	0.252	0.381	0.230	0.100	0.086	0.130	0.100	0.130	0.130	0.144
Potash	0.131	0.169	0.014	0.046	0.023	0.014	0.053	0.030	0.021	0.014
Phosphoric acid	0.025	0.012	0.076	0.064	0.076	0.058	0.064	0.064	0.051	0.051
Sand and silicates	64.200	72.800	81.000	79.200	89.000	93.800	73.600	88.600	87.800	79.600
Chlorine	0.017	0.019								
	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000
Containing nitrogen	0.667	0.425	0.403	0.392	0.425	0.492	0.386	0 403	0.369	0.464
Equal to ammonia	0.810	0.516	0.489	0.476	0.516	0.591	0.469	0.489	0.448	0.564
Lower oxide of iron	Much	Fair	Good	Good	Good	Good	Good	Good	Good	Good
Acidity	..	..	Marked	Marked	Marked	Marked	Marked	Marked	Marked	Marked"

Federated Malay States Agriculture in 1906.

1906 was a prosperous and in some directions exceptionally progressive year for agriculture in the Federated Malay States. The climate of the Peninsula is not subject to the vicissitudes which obtain in other tropical agricultural countries. The fact that the climate is so equable causes a constant active growth of vegetation, and consequently all our crops—whether annual or perennial—show much greater progress than the same plants during the same time in a country like Ceylon or South India, where prolonged periods of extremely small or absolute lack of rainfall cause temporary cessation of growth.

The only drawback to the equable climate is that there is no "close time" for insects or fungal pests. In a country where a drought occurs at regular intervals parasitic fungi receive a serious check, no spores can germinate in dry air and many are killed. Insects also are prevented from spreading by a drought and by constant heavy rainfall.

Coconut Plantations.

The various cultivations of the Native States have suffered from no abnormal pests or diseases. The report of the Inspector of Coconut Plantations gives an interesting account of the prevention and cure of the disease due to beetles in this most useful and profitable plant. The work in charge of Mr. Brown and his subordinates is of great economic value to the country, and the fact that the coconut industry is in such a flourishing condition is in no small measure due to their efforts.

That the glamour of rubber cultivation, with its promise of exceptionally large profits, should prevent the appreciation of a cultivation, which has been aptly called "Consols of the East," is perhaps only to be expected, but, as the Inspector of Coconuts points out, it is palpably a foolish proceeding, while plenty of good jungle land is still available for rubber planting, to cut down healthy coconut trees which are near to the yielding period in order to put rubber in their place. The fact that the price of copra steadily rose during the year till it was more than 30 per cent. higher in December than at the beginning of the year accentuates this mistaken policy.

Padi.

The rice crops in the north of Perak and in Kuang District of Selangor suffered considerably from insect pests last year which are dealt with in detail in the Government Entomologist's report. With these exceptions the crops during 1906 were above the average, the plants were well grown and healthy, and the straw as well as the grain showed vigour and health. The area cultivated under padi was about 83,000 acres.

In view of the large irrigation area in Krian, where rice can be grown under exceptionally favourable conditions, a series of experiments has been initiated to improve the methods of planting and cultivating rice. In order that the Malay and other rice-growers in the district might be able to observe and learn the results shown by these experiments, a plot of land near the main road, situated in a central place at Bagan Serai, was selected. The field is at the north side of the road from Bagan Serai to Sungei Gedong, about ¼ mile from the Irrigation Engineer's house.

Mr. G. E. SHAW, 2nd Assistant District Officer, Krian, has taken a great interest in these experiments and with the Irrigation Engineer, Mr. WILKINSON, has kindly superintended the various operations.

The following experiments were began in September last. In all the plots, except plot 7, Padi "Saraup" was used, this being the one considered best locally:

Plot 1. Planted as practised locally;
,, 2. Drilled;
,, 3. Planted more thickly;
,, 4. ,, less ,,
,, 5. Manured with phosphate manure;
,, 6. Selected seed;
,, 7. Ceylon selected seed.

These experiments are not intended to radically change the present methods of cultivation but to show to the padi-growers that methods may be improved and crops increased. It is intended to try alternate crops of leguminous and other plants on these plots and show the advantage of growing a plant which does not take much out of the soil, instead of allowing it to "drop down" to weeds.

Regular irrigation is of great value and in preventing the attacks of various evils. If water can be applied at the right time the larvæ of many non-aquatic pests are destroyed, and some of the pests whose larvæ are aquatic are destroyed by taking the water from the land at the right time.

A report of these experiments will be published when they have been continued long enough to give definite results. Their object is not to show that by entirely altering present methods of cultivation, with probably increased expense and labour, a large and profitable return can be gained, but to encourage the gradual improvement of existing methods of padi cultivation.

Coffee.

The acreage under coffee has again considerably decrease and only a few acres have been planted up. A large proportio of coffee acreage has been interplanted with rubber, the forme being gradually cut out.

Prices have remained fairly satisfactory, and were it not fo the fact that rubber is considered to the exclusion of all othe cultivations, coffee would be increasing instead of gradually bein wiped out. Leaf disease on coffee is still with us, and there i little hope that while coffee remains this pest will cease, but th crops have not been very seriously affected by them. The Nativ States has produced 22,291 cwts. of coffee from 9,708 acres, a average of about $2\frac{1}{4}$ cwts. per acre, but this acreage includes great deal of coffee which is growing under rubber of three year and upwards and consequently gives little or no crop. Selango has nearly four-fifths of the coffee acreage, and the crops in tha State work out at an average of a little under 3 cwts. per acre.

Rubber.

The position of the rubber planting industry in Malaya a the end of 1906 compared with that at the end of the previou year is remarkable but not unexpected.

In December, 1905, the total acreage of rubber planted in th Peninsula was probably less than 50,000 acres; in Decembe 1906, it was 99,230, practically during the year 1906 the acreag was doubled. The number of the trees, which was probabl under 7,000,000, is now 12,980,756. The output of dry rubbe which was about 150 tons in 1905, was in 1906, 412 tons, a increase of nearly three times.

This result has not been achieved without strenuous effort and that such an acreage has been felled, cleared, lined an planted, and with a very few exceptions is now showing a vigour ous growth of healthy rubber trees, is a tribute to the zeal an energy of a body of about 100 planters.

The conditions under which new land is opened are no favourable either to vigourous health or enjoyment of muc leisure, and the excellent work of these pioneers is apt to b overlooked by the proprietors and shareholders at home who wi ultimately benefit by it. In this connection I may be allowed t to suggest that as the health of both master and coolie is of para mount importance in the profitable running of an estate mone expended in building comfortable and even luxurious bungalow and lines is a sound investment. The Superintendent is mor likely to retain his health if when he finished his day's work h has a cool, airy and water-tight bungalow and a comfortabl

bathroom to refresh him, instead of a wooden hut, hastily built and full of leaks. The Superintendents' bungalows on most estates give the impression that the rubber industry is in a parlous state, instead of one of the most, if not the most, profitable industry in tropical agriculture.

The lines, as a general rule, are relatively more comfortable than the Superintendents' houses. Most of them are raised some 5 or 6 feet from the ground, and as the space underneath is used by the coolies for their cooking operations the whole of the rooms are constantly fumigated or insects driven away.

An interesting and instructive article on coolie sanitation and the methods to be adopted in various coolie diseases to which is appended plans for lines has been prepared by Dr. GERRARD for the "Agricultural Bulletin." It will be useful to planters in Malaya as a handbook to the medical treatment of estate coolies.

RUBBER STATISTICS, MALAYA, UP TO THE 31ST DECEMBER, 1906.

——	Federated Malay States.	Straits Settlements.	Johore.	Total.
No. of estates	242	5	7	254
Total acreage	85,579	11,341	2,310	99,230
Opened during 1906, acres	42,154	4,098	1,355	47,607
No. of trees planted up to the 31st December, 1906..	10,745,002	1,987,954	147,800	12,980,756
No. of trees tapped ..	441,488	27,076	48,350	516,914
Dry rubber extracted, lbs.	861,732	13,560	47,724	923,016

YIELD OF DRY RUBBER PER TREE.

The average amount of dry rubber extracted per tree, calculated by the figures in the tables gives 1 lb. 12 oz. per tree. Many of the trees in the Federated Malay States are 10 years old, and some over 20 give a good deal more than 2 lbs. a tree, but even taking this into consideration this average is a high one, and if it is maintained means a very large margin of profit over expenses of production.

FEDERATED MALAY STATES RUBBER PROGRESS.

At the end of 1905 there were in the Federated Malay States alone about 40,000 acres planted with rubber. At the close of 1906 more than 85,000 acres. Between 6,000,000 and 7,000,000 trees at the beginning of last year, and on the 1st January this year over 10,000,000. The output of dry rubber was about 130 tons in 1905 and in 1906 385 tons, three times as much. The reason, that while the acreage has more than doubled the number

of trees has not proportionately increased so much, is that the number of trees planted per acre during 1906 was not so many as previously.

That all the plants, young and old, should be alive and vigorous in 1906 is practically impossible, even with skilled care and perfect conditions there must be among plants as among all other living things a percentage of deaths continually going on. Drought, excess of moisture, sudden winds, insect, fungal, and bacterial pests and many accidental causes are responsible for a certain number of deaths of plants at various stages of growth on every estate.

Every Superintendent endeavours to reduce the number of these casualties as far as possible, but if one in every 300 trees dies each year this need not be considered a high percentage in trees of 5 years and upwards, and the mortality is greater before that period. So that we may expect that of the 10 million trees something between 9 and 10 million will be alive and flourishing in 1912, and this at 1 lb. per tree will give about 4,250 tons or $\frac{1}{33}$rd of the probable world's consumption in 1912.

RUBBER STATISTICS, FEDERATED MALAYS STATES, UP TO THE 31ST DECEMBER, 1906.

——	Selangor.	Perak.	Negri Sembilan.	Pahang	Total.
No. of estates	119	89	25	9	242
Total acreage	44,821	29,612	10,663	483	85,579
Opened during 1906, acres	19,063	17,678	4,945	468	42,154
No. of trees planted up to the 31st December, 1906 ..	5,477,390	3,990,462	1,196,150	81,000	10,745,002
No. of trees tapped ..	364,638	67,710	91,410	..	441,488
Dry rubber extracted lbs. ..	620,033	94,841	146,891	3,645	861,732

THE FUTURE OF PLANTATION RUBBER.

Accurate estimates of the world's rubber consumption are not easy to make, the only reliable data available are found in the crude rubber export and import returns of the five large rubber consuming countries, viz., Great Britain, United States, Germany, France and Belgium.

The gross import returns include rubber which is afterwards exported from these five countries to each other, but also includes all the rubber which is exported to other countries whose import returns are not available.

The nett import returns, *i.e.*, the import minus the export—do not give a correct figure of the world's consumption, and it is probable that the gross imports of these five countries are much

nearer to the total of the whole world's cousumption than the imports. I estimate the world's consumption in 1906 to be approximately 80,000 tons. Of this amount the Malay Peninsula contributed $\frac{1}{200}$th part or $\frac{1}{2}$ per cent. If the whole of the rubber trees planted at the end of 1906 are growing vigorously and yielding 1 lb. of dry rubber per tree, in 1912 the total production will be 5,475 tons, which will be $\frac{1}{26}$th or little more than 4 per cent. of the total rubber required. In order to estimate the world's consumption in 1912 the rate of increase (10 per cent.) during the last seven years has been added, giving a total estimated consumption for 1912 of 142,352 tons.

If we increase the yield to $1\frac{1}{2}$ lbs., *i.e.*, estimating that every tree planted now will in 1912 give us $1\frac{1}{2}$ lbs. per annum, at that date the Malay Peninsula will furnish 8,213 tons or $\frac{1}{17}$th of the estimated world's consumption at that date.

These calculations do not increase the fears so often expressed that production will in the course of a short time exceed demand. The question of how much Brazil will continue to produce, whether it will increase or decrease, is one which only those with a knowledge of the Brazilian jungles can judge, and even such are not able to tell us whether the supply can be depended on to continue or may be expected to grow less in the few years.

There are many reasons for considering that the consumption of rubber may in the near future increase more rapidly than in the past. New uses and expansion of old uses for rubber are constantly being found, the consumption of rubber per head in most countries is extremely small, in Britain and other European countries less than in America. If producers are wise they will not neglect to do everything in their power to stimulate and expand the rubber consumption, money wisely spent in this direction will be handsomely repaid in the future by a steadily widening, firm market.

Health of Trees on Rubber Estates.

The general health of rubber trees of all ages, from seedlings to 25-year old trees, has been during 1906 excellent. Diseases have occurred in nurseries and on older trees but not affecting a very large number of cases or a large percentage of trees on any except two or three estates. The rapidly increasing area of rubber, with its thousands of trees added monthly, means an increased danger of spreading disease, and should bring with it an increased vigilance with regard to the first signs of disease and promptitude to take steps to prevent it growing any further. I have prepared a pamphlet entitled "First Aid to Plants" which will be circulated among planters, giving briefly the methods to be employed at once in any cases of suspected disease either of

insect or fungal origin. The importance of this branch of the routine of an estate cannot be too often or too forcibly preached.

My experience of nearly ten years' investigation of and fighting with diseases of cultivated plants in the tropics leads me to the belief that the policy of waiting to shut the stable door until the horse has gone is still not unusual even with the most capable and practical planter.

Pests, both fungal and insect, must come in every cultivation, and no plant, however vigorous or with the most perfect conditions for its growth, can be considered as not liable to contract some disease. These occasional deaths of plants may, if unattended to, eventually cause most serious loss.

The scientific officers of the department can be of much help to agriculture in the direction of investigation of diseases in cultivated plants with a view to their prevention and cure. Unfortunately the importance of the plant doctor is not yet recognised as fully as that of the medical man or veterinary surgeon. This is to a great extent because the fact is not realised that all lack of health or vigour is due in plants, just as in man, to specific causes either of environment or to the attacks of insects, fungi or bacteria. The past history of plant doctoring is not entirely a succession of triumphs over disease, but it compares very favourably with the results obtained in human medicine, and should by this time have secured the confidence of the planter, farmer and gardener.

In order that the technical knowledge of the officials may be most utilised it is important that early information as to the outbreak of any pest is sent to the department, and specimens of all stages of the disease, with as much information as the Superintendent can give as to the first signs, the conditions of the field, if well drained or with water very near the surface, the age of the trees attacked, whether the disease was noticed first in one place or at different centres, how quickly it has spread, and all other observations which have been made. A full letter, even though it contains some things that may seen trivial and of little use, is of much greater help than the sending of a short note with a single leaf and the request "I am sending you a specimen of disease I have noticed on my rubber, will you let me know if it is likely to be serious and what measures I should take to prevent its spreading."

Distance of Trees in Planting.

Planters have begun to see the value of giving their trees plenty of room, and the argument that to plant more trees than is intended to permanently keep has been seen to be both fallacious and dangerous. Fallacious, because with prices at 5s.

and more per ℔., and with a very reasonable hope of continuance of such prices, owners will not keep to their intentions in thinning out trees which are giving them a profit of $1 or $2 each; and dangerous because if they did steel their hearts and cut out their trees the policy of leaving large numbers of dead rubber roots among healthy trees is one which any one acquainted with root diseases, both due to fungi and insects, would condemn as running serious risks of encouraging that most insidious type of pest.

The practice, now very general, of planting at unequal distance, *i.e.*, in avenues of trees 24 ft. by 30 ft. or 20 ft. by 17 ft. has many advantages. It admits direct sunlight all over the ground for a short period every day. The sun is the cheapest and most effective weapon against the attacks of fungi and bacteria that the planter possesses. When the trees are 10 years old or more the avenue system allows of quicker and more effective supervision of the health and vigour of trees, and is a help in enabling the Superintendent to easily locate trees on the estate for ordinary or for disease prevention work.

As to the exact distance which trees should be planted, situation, soil, rainfall and other factors must be considered, but it is better with an eye to the future to err on the side of planting too few rather than too many.

On more than one-third of the total planted acreage in Malaya there are 200 trees or more per acre, that is the trees are, if planted at equal distances, 15 ft. by 15 ft. or closer. On only one-seventh of the acreage are the trees less than 18 ft. by 18 ft. The average figure conveys very little information.

Labour.

In the Federated Malay States there are 39,000 coolies employed regularly at estate work; of these nearly 30,000 are Tamils, 4,000 Javanese, 1,500 Malays, and 3,400 Chinese; some of the last are only temporarily employed and are not working at agricultural tasks, but are employed in building, road-making, etc.

The average of trees tapped to coolies employed is only 11 trees per coolie, but this has no value as 90 per cent. of the coolies are employed in opening, planting, weeding, etc. When, however, the 13,000,000 trees already planted in the Peninsula in say 5 years are all in bearing, about 50,000 coolies will be needed for the tapping operations alone, and the labour question is therefore of paramount importance. The outlook is by no means unpromising. If all proprietors and superintendents realise the fact that the coolies health and comfort are as much a factor in the profitable running of the estate as the amount of latex each tree can be got to produce, or the price that the rubber will fetch in the market, this required labour can be obtained.

Estate Labour, Federated Malay States.

	Selangor.	Perak.	Negri Sembilan.	Pahang.	Total.
Tamils	17,803	9,169	2,327	59	29,358
Javanese	1,799	1,859	395	17	4,070
Malays	455	• 739	247	58	1,499
Chinese	642	2,353	418	20	3,433
Banjares and other races	538	234	127	15	914
Total ..	21,237	14,354	3,514	169	39,274

Coolie Sanitation.

The question of the health of coolies on estates, the sanitation of their lines and the prevention or minimising of malaria, dysentery, and other diseases to which the labour force is specially exposed, is being particularly considered by Government.

The health of the labour force is one of the most vital matters in the success of rubber-planting, and it therefore becomes as important from an agricultural point of view as the health of the plant or the soil in which it grows. The observations which I have made in visiting estates and in asking the medical men in charge of planting districts all over the Peninsula leads me to the belief that there are two factors which militate against the highest state of health and vigour in estate coolies.

The first being that a proportion of coolies come to an estate in what a lay-man may call a damaged condition, so that they do not start with a clean bill of health as regards malaria or other specific disease, or possessing an amount of reserve material which fits them to stand well any disease in itself trivial which they may contract soon after arriving.

On one estate I specially observed the fat, healthy and vigorous appearance of the whole of a large force of some 200 which had joined the estate some weeks, and the Superintendent informed me that he attributed it to the fact that these coolies had been for four weeks or more kept in quarantine, resting, supplied with good food, and medically attended.

The gain of the coolie "starting fair" when he first arrives is well worth the cost of his being looked after and fed before he comes.

A Substitute for Weeding.

One of the most important questions in relation to the economical conduct of a rubber estate is that of the weeding.

Allowing weeds to grow among the rubber and consume both plant food and moisture can be shown to markedly lessen the rapidity of growth of the trees in the plantation. In Ceylon, the case of weeding is on a different footing to that which exists on the large majority of estates in the Federated Malay States. In the former country the cultivation to some extent of the soil by weeding is in itself of value, as the soils are often packed on the surface and prevent the free passage of air and water, the pulling of weeds and scraping the surface is tillage which benefits the rubber trees. In the rubber-growing districts of Malaya the soils generally are of so porous and friable a character that the partial cultivation which weeding gives, is of little or no value. On undulating or steep lands the disadvantages of constantly disturbing the surface, causing the loss of top soil during heavy rainfall, is very marked, and the difficulty of making efficient drains is increased by the fact that each rainfall means the introduction into the drains of large quantities of silt.

The cost of weeding is becoming a very serious charge, and is in fact the heaviest item of expense during the period before trees can be tapped. In the second, third and fourth year on some estates weeding cannot be efficiently done for much under $2 per month per acre. Thus on a 1,000 acre clearing, weeding causes a very large annual expense, in some years amounting to a charge of over $20,000.

The relatively high cost of weeding has led some planters to abandon weeding, or to weed only partially, either a space round each tree or a strip down the line. In these cases the growth of grass and other weeds is checked by regular cutting.

That the presence of grass and other weeds retards to some extent the rapid growth of young rubber can be demonstrated, but the fact that on many estates where this treatment has been practised the trees are growing vigorously and yielding well, leads planters to consider the damage done by weeds as not sufficiently great to justify the cost of their extermination.

The position in the Federated Malay States is that the only object of weeding in rubber estates is to prevent the harmful competition of useless plants among the trees. If, however, a plant is proved to be not useless but advantageous to the trees among which it is growing, then its removal is neither necessary nor wise.

Leguminous plants, *i.e.*, of the Clover, Pea, Crotolaria tribe—are characterised by the presence of bacteria in their roots, living in what is called symbiotic relationship, *i.e.*, both organisms being of mutual service to each other. These bacteria, which cause nodules on the roots, absorb free nitrogen from the air, and

thus increase the amount of plant food available in the soil where they are growing. This property of leguminous plants has been the subject of a large number of practical experiments which have definitely shown the improvement of soils where bacteria-bearing leguminous plants are growing.

The introduction of a leguminous plant in rubber estates to take the place of the weeds which grow so vigorously and are so expensive means therefor an automatic manuring of the soil, and a conservation of surface soil which will otherwise be frequently washed away.

The best plant for this purpose is one which is sufficiently vigorous under all conditions to spread and hold its own against other weeds when once introduced. A plant which needs careful attention in order to make it cover the ground is unsuitable and might be as costly to maintain as weeding.

During the past year I have been carrying on observations and experiments with a view to the discovery of a suitable plant and believe that sensitive plant *Mimosa pudica* fulfils to a much greater degree than any other the required conditions. I have examined a large number of plants on different soils, in the open and under partial shade, and have found in nearly all cases that their roots contain nitrogenous nodules. It grows vigorously, and is one of the very few plants which can compete with "lalang" *(Imperata arundinacea)* with any chance of victory. In size it is suitable as it seldom grows to a greater height than 18 in. to 2 ft. It is peculiarly free from attacks of fungi and insects, a character which is of importance in any plant which it is proposed to introduce in large quantities among cultivated plants. It's fruits are not eaten by animals or insects, and therefore it cannot prove attractive to rats or other undersirable animals as are ground-nuts or other leguminous plants with edible fruits.

It is a native of Brazil, and like *Lantana*, *Tithonia*, and *Hevea braziliensis* itself is an interesting instance of an exotic plant, finding here, in the country to which it has been introduced, conditions as favourable, and probably more so, than those in its native land, and consequently growing and spreading with great energy.

The only point against this plant is the presence of sharp, hard thorns which make walking bare-legged through it unpleasant, but this is unimportant during the earlier years of a plantation before tapping. A plot of Mimosa has been laid out at the experiment station for seed purposes, asd this will be used for sowing or planting down an experimental plot of rubber, and a field of rubber has been laid down with this plant. During the year I have been searching with not much success for some individual plants which possess fewer or smaller thorns, or if

possible an almost thornless plant. If such a plant or plants can be obtained, the production of a race of thornless Mimosa can be accomplished, and I would ask all planters and others interested in this question to be so good as to observe the Mimosa in their vicinity and let me have any plants that show any tendency to be less thorny than the average specimen of sensitive plant.

The sowing down or planting of cuttings of this plant on areas after clearing them of weeds should, if efficiently done, need no further care. In order to get the largest amount of benefit from the nitryfying organisms on the Mimosa it is necessary each year to cut it down, forming a mulch, and allow it to grow up again.

As the mimosa does not thrive in shade when the branches of the trees in a plantation meet and keep out direct sunlight entirely, the sensitive plant will be gradually killed.

The amount of nitrogen added each year to the soil by the presence of the roots of the Mimosa is estimated at from 150 to 200 lbs. per acre.

Any planter laying down all or a portion of his estate with this plant will greatly help by sending to me figures of cost and results. It will be of greatly value if some area of similar rubber is still weeded as a "control" experiment in order that the difference can be more readily judged.

Since writing the above notes, Mr. C. M. F. Ross, of Sungei Buloh Estate, has brought to my notice the fact that a small creeping plant of the clover tribe, *Desmodium triflorum D. C.*, is prevalent in his district on railway banks and bare spaces.

I have examined the roots of this plant and they contain large numbers of nitryfying bacteria. The plant is a small shamrock, making a close turf on the ground not more than 2 or 3 inches high. If this plant will hold its own and drive out undersirable weeds it has advantages over the *Mimosa pudica*, and I shall experiment with it in order to test its value compared to the sensitive plant in rubber cultivation.

Ceylon Rubber Exhibition.

All producers of rubber were much interested in the Rubber Exhibition in September organised by the Ceylon Government. Those planters who attended learnt both from the exhibits and the lectures and discussions much that was of great practical value to them in their work. I was deputed to officially represent the Federated Malay States and Straits Settlements at the Exhibition, and with Dr. Wills (Director Royal Botanic Gardens, Peradeniya, Ceylon), Dr. Cuthbert Christy (Uganda),

Mr. M. Kelway Bamber (Goverment Chemist, Ceylon), and Mr. G. H. M. Hyde (Machinery Expert), judged rubber machinery, tapping knives and other classes. I also attended the lectures and discussions and contributed a lecture on rubber in the Malay Peninsula. A full account of the proceedings have been published in the official account of the exhibition entitled "Rubber in the East," it is therefore not necessary to describe fully the many points of interest which the show possessed. The more important lessons which the exhibition and conferences taught were :—That the quality of plantation rubber can be improved by making it in block form instead of crêpe, sheet or biscuit. The block form is preferred by buyers on account of its being more like the Brazilian Para, which they consider the best rubber for manufacturing purposes. It has in comparison to crêpe, sheet or biscuit, hardly any surface for the attacks of moulds and bacteria and consequently travels better and with much less deterioration. It is less bulky for storing and shipping. Also that the rubber trees will grow vigorously and produce high quality rubber at considerable elevations above the sea. This was clearly shown by the fact that the prize of the show was carried off by rubber made from trees growing at 2,500 feet above sea-level.

Preparation of Rubber for the Market.

Our knowledge of the best methods of preparation of plantation rubber for the market is still in the plastic and changeable stage. Biscuits have had their day, and on all estates producing any quantity of rubber they have been abandoned as unpracticable when large quantities of latex are to be treated. Sheet or crêpe have both their advantages and the manufacturer has learnt to appreciate their fine qualities. But the goal to which the rubber planter is making in relation to the improvement of his product, is the preparation of a rubber which the buyer and manufacturer will consider as good as or better than the finest Brazilian Para.

The qualities of resilience, elasticity and durability which characterise the Brazilian rubber must be produced in plantation rubber, and the discovery of the means by which this end can be obtained has been the subject of much consideration, experiment and observation both here and in Ceylon.

Acetic acid and creosote, which in the case of the preparation of Brazilian rubber are added by submitting the latex to smoke containing these substances, have been introduced in the case of plantation rubber by mixing small quantities of these two substances in solution.

The acetic acid produces quick coagulation, and the creosote is an efficient antiseptic and prevents the growth of bacteria which produce "tackiness" or other putrefaction of the dry rubber.

The physical treatment of the Brazilian Para which is sent home in blocks consisting of a series of thin films of rubber, each dried so that it contracts and produces an automatic pressure, is most probably one of the factors which give it its resilience and elasticity. This has been imitated by artificial pressure, under a screw press, of the rubber into blocks of approximately the same density as the Brazilian Para. The presence of a certain percentage of water in the Brazilian block may be one of the factors which add to its good qualities and the retention of a percentage of water instead of the complete drying which had previously been carried out in the Federated Malay States rubber has now been tried with success. Wet block rubber sent home from Malaya and Ceylon was received with satisfaction by the buyer and fetched a higher price than any other plantation rubber on the same day. This price was higher than that given for plantation rubber, and as the wet block contained about 9 per cent. of moisture, the price of the dry rubber in the block instead of being 5*s.* 10½*d.* was 6*s.* 4¾*d.*

It will be well for the Federated Malay States rubber industry to adopt a uniform method of preparing rubber for the market. If various forms of rubber biscuit, sheet, crêpe, worm, etc., are sent to England as well as block the buyers and manufacturer are not able to form a sound judgment of the merits of Malaya plantation rubber. The manufacturer can get large quantities of equal quality of Brazilian Para. He knows by experience what treatment and admixtures to this rubber are necessary to produce a certain manufactured article. He is doubtful, from lack of experience, as to how plantation rubber should be manufactured to give the proper resilience, colour, durability, etc., which is required in the articles he has to make. If he can get large "breaks" of uniform quality of plantation rubber he will soon learn how it has to be treated to produce the required effect in the manufactured article.

The manufacture of wet block rubber, *i.e.*, rubber which after being coagulated and asepticised is at once pressed into blocks, is a great saving in time, and in the space and plant required. Rubber can be prepared for shipment a few hours after the latex has been taken from the tree.

The block rubber travels better without the deterioration *en route* to which the other forms having large surfaces exposed are very liable.

The production of wet block, free from putrefaction, of a convenient size and weight, and containing a uniform quantity of water, say 10 per cent , seems at present without doubt the best method. While it appears to be a pity to abandon the preparation of our crêpe and sheet, both of which the buyers have learnt to appreciate, but if the preparation of wet block is more

economical and expeditious, and at the same time it will command as good or a better price than crêpe or sheet, then there can be little reason against making the change.

Market Prices.

The market prices of Malayan plantation Para showed a considerable decrease on the previous year, during which prices owing to shortage of stocks, stimulus to rubber manufacture and and other reasons, had reached the maximum of 6*s*. 10*d*., while at the same time Brazalian Para had also reached the highest price touched, 5*s*. 9¼*d*. The close agreement in the fluctuations in the market prices of the two varieties of rubber, wild and cultivated, is interesting, showing that the demand for rubber as a whole and not for any special quality of rubber is the dominating factor.

During 1906 the prices of best cultivated Para, which in January stood at 6*s*. 1¾*d*. after a gradual rise of 1½*d*. up to the end of March, began to recede in an evenly descending scale, until in December the price stood at 5*s*. 5½*d*. recovering a little before the end of the year and at the time of writing being 5*s*. 9*d*. The prices of Brazalian Para took practically the same course, beginning at 5*s*.5*d*. and receding to 5*s*.1*d*., being as a rule about 10 per cent. to 12 per cent. below the cultivated article.

The fact that the Brazilian Para contains about 20 per cent. of water bring the price of the caoutchouc sold in Brazilian blocks to 10 per cent. more than that fetched by the caoutchouc in the pure cultivated biscuit or crepe rubber.

The factors which affect the price of rubber, and which must be considered in trying to foresee the future market price of this product, are many and various. How much the demand for rubber will increase is not easy to foretell, but rubber at the present high prices continue to find fresh markets and new uses and there seems no reason, except the perhaps natural one that such a satisfactory state of things is too good to last, which can be given for prophesying any considerable drop in price.

Alienation of Land for Planting.

The duty of deciding whether land is of first or second class value, which falls to the Director of Agriculture, has occupied a great deal of time which would have otherwise been employed on scientific or other departmental work. More than 25,000 acres of jungle were examined and reported on, the knowledge thus gained of the land available and suitable for rubber and other products is most valuable, and leads me to the conclusion that there are very large areas of land quite as suitable

for rubber cultivation as places already planted; new roads and branch railways will greatly assist in the opening up these new districts.

While large areas have been planted in rubber, still larger areas, amounting at the end of 1906 to some 200,000 acres, have been applied for and granted for this cultivation. The State of Perak has gone ahead more rapidly than Selangor in rubber planting, and in Lower Perak an entirely new rubber district, in which rubber is growing with quite as good results as in the more popular rubber-growing districts, has been opened and planted. This district, S'tiawan, is at present very inaccessible but a connecting road has been begun.

The fact that the Klang district, where rubber was first planted, has now been all taken up for rubber and no more remains unalienated, has forced would-be rubber planters to go further afield, with the result that in Selangor, Perak and Negri Sembilan fine clearings have been made in new districts.

Protective Forest Belts.

The value of protective forest belts was explained in the last report and these necessary guards against plant diseases are still occupying my attention, and Government will be asked to continue the policy and reserve more of these belts to cut off various planting districts from each other. Dr. Treub, of Java, who is the greatest living authority on tropical agriculture, is much interested in these protective jungle belts, which, he considers, a sound and wise provision which unfortunately in Java and other agricultural countries it is now too late to lay out as too much land has already passed away from the control of the State.

Camphor.

Experiments have been made with the propagation of camphor by means of cuttings. The first trial of some thousands of these was not successful owing to lack of supervision, but more have been struck and it is hoped to be able to produce a stock of young plants.

As the camphor plant does not fruit until it is some 30 or 40 years old it is important to learn how it can be propagated by cuttings. More seed will be obtained from Japan where the only seed trees are known, and plants from these seeds when established will be available for planters who wish to give this plant a trial.

While not recommending that the cultivation of camphor should be taken up over large areas it must be remembered that the price of camphor is exceedingly high and the prospects of high

profits are excellent. The growth of the trees at the experiment station is most encouraging and compares very favourably with the same age trees in Ceylon even at higher elevations, which are supposed to be more suitable for camphor cultivation. some 300 trees at the Experiment Plantations, Batu Tiga, growing only a few feet above sea-level, have attained in two years a height of 12 to 14 feet.

Eradication of Lalang.

The experiments with spraying to the eradicate lalang were continued during the year. The use of arsenite of soda was found to be effective if properly applied.

The want of efficient spraying machines at present prevents the general trial of this cheap method of killing out lalang and other persistent weeds. In addition the prohibitive local cost, 500-800 per cent. more than retail prices in Europe of the arsenic and the soda, make the cost per acre too high to pay. Arrangements have now been made to get supplies at reasonable rates from Calcutta. With the cost of the materials not much more than the retail price in England, and an efficient machine which gives a fine spray, the total cost per spray should be under $1.50 per acre; three or four sprays is enough to entirely kill the lalang. No damage is done to the roots of plants growing in the same ground, the spray being only a leaf poison.

Some young rubber plants in pots in which the earth was regularly watered with the solution in twice as large a proportion as is used in spraying lalang were in no way affected by the application.

An experiment over some acres is in course of progress, and when finished the result with cost of materials, labour, etc., will be published.

Rubber Cultivation at Various Elevations.

The rubber trees at the Experiment Station, Gunong Ansi, are growing vigorously. Mr. W. F. Rowland, whose estate is at the base of the hill, kindly acted as Hon. Superintendent during the year, and takes great interest in the progress of the plots, which are situated at regular distances from sea-level to 2,400 ft. Measurements of height and girth of all trees are being carefully kept, and these will be published later.

Scientific and other Visitors.

Several scientific and agricultural experts visited the States during 1906 and availed themselves of the information at the disposal of the department. Professor Engler, Director of the Botanical Gardens, Berlin, and of world-wide reputation as a systematic botanist, made a short tour through the States collecting Aroidæ.

Dr. OLSSEN-SEFFER, the Director of Agriculture, Mexico, investigated our rubber industry and gave interesting information respecting the rapidly growing rubber industry of his country.

The Hon. Mr. STAINFORTH SMITH was delegated by the Australian Government to examine the methods in relation to agriculture, mining, etc., of the Federated Malay States and Java, and spent some weeks in the Native States. On his return he wrote a report dealing with the question of what he had learnt and in relation to the opening up of British New Guiana, has since been appointed Director of Agriculture, Public Works and Mines in New Guiana. Mr. M. KELWAY BAMBER, Government Chemist, Ceylon, Mr. CREMER, late Secretary of State for the Colonies to the Netherlands Government. Among those interested chiefly in the rubber industry who visited the Native States were the Earl of CARNARVON, Messrs. T. N. CHRISTIE, G. A. TALBOT, A. LAMPARD, R. MORRISON, F. CROSBIE ROLES and R. DAVIDSON.

LIBRARY.

The library of the department has been added to during the year, many necessary scientific books and periodicals having been obtained, and as one of the chief functions of the Department of Agriculture is the giving of advice on technical matters a working library is essential, and within the next few years it is intended to form a library so that scientific and other technical work can be carried on without serious loss of time and energy in having to refer to Europe for information.

A card catalogue of the books, pamphlets and other sources of information at the disposal of the department has been begun and will much expedite the information bureau work.

During the year over 1,000 letters of enquiry relating to agricultural matters were received and attended to, some 250 of these were from foreign countries.

J. B. CARRUTHERS,

Director of Agriculture and Government Botanist, F.M.S.

REPORT OF THE INSPECTOR OF COCONUT PLANTATIONS FOR THE YEAR 1906.

The area under coconut cultivation at the end of 1906 in the Federated Malay States may be estimated approximately 105,000 acres, apportioned to the four States as follows:—

Perak	53,395 acres.
Selangor	19,216 „
Negri Sembilan	17,196 „
Pahang	15,193 „

An increase of about five per cent. over the preceding year.

Of this acreage rather more than one-half is in bearing, and I value the whole roughly at 20,000,000 dollars.

Some idea of the local importance of this industry may be gathered when I mention, taking an average of 40 nuts per tree (a very reliable return when the trees have reached maturity) that if the whole of the yield of the above acreage were converted into copra it would be capable of producing 800,000 pikuls; to say nothing of the large and very valuable stock of fibre that would be available for the manufacture of coir matting, rope, etc. Copra is at present fetching nearly $11 per pikul, and owing to its strong statistical position the price is more likely to rise than otherwise.

I now refer to the States in regular order.

State of Perak.—The staff was the same as in the previous year, consisting of five Sub-Inspectors, stationed at Telok Anson (Lower Perak), Kuala Kangsar (Upper Perak), Bagan Serai (Krian, Selinsing and Selama), Batu Gajah (Kinta), and Matang (Matang and Larut), respectively.

Cultivation.—The total area under coconuts in the State at the end of 1906 I estimate approximately at 53,395 acres, the district of Lower Perak alone contributing nearly 30,000 acres. These figures show an increase of 2,695 acres over the preceding year, made up from the various districts as follows:—

Lower Perak	347 acres.
Kuala Kangsar (Upper Perak) ...	155 ,,
Krian, Selinsing and Selama ...	1,750 ,,
Kinta	333 ,,
Matang and Larut	110 ,,

Beetle Pests.—The damage done by these insects during the year throughout the State was practically insignificant. Kinta was quite free from the pest, and the only trouble I had at Lower Perak was at Pasir Blanda, afterwards referred to. At Kuala Kangsar about 120 trees had to be treated, and at Matang about 472 beetles were destroyed. In the Krian district the catches were heavier, the attacks being almost entirely restricted to the Chinese sugar estates. One thousand eight hundred of the black beetles were collected and 201 of the red beetles.

Lower Perak.—The Sub-Inspector has continued to do some useful work. The coconut plantations owned by the natives are in better condition than in the previous year. As a whole the kampongs are kept in very good order and the owners are taking

more interest in their holdings; even those who have young trees, not yet in bearing and giving no return, are doing their best to keep them clean. I am disappointed that the export of copra, 23,514 pikuls, was so little in excess of the previous year, and I can only acccount for this by supposing that owing to demand for the coconuts themselves there must have been large deliveries for up-country consumption, and also perhaps for export to the Straits, but as regards this no record seems to have been made.

The acreage opened up in coconuts during the year was much less than in 1905, but this I attribute to the difficulty of transport, communication, and want of drainage, which is more keenly felt as the planting is extending away from the present bridle-paths in Circular Road from Bagan Datoh to Utan Melingtan, and I am assured that as soon as the works in contemplation, and which are now being carried out in the locality with the object of alleviating these troubles, are completed, there will be among the natives a great extension of coconut planting again in these parts. The European plantations at Bagan Datoh are making good progress; on Bagan Datoh estate about 1,400 acres are now planted, and at Strathmashie 700 acres.

I regret to report that very serious harm was done by bears to some native holdings at Pasir Blanda, and 475 coconut trees damaged beyond all hope of recovery. Apart from the loss of the trees, which were just coming into bearing, the owners had to incur the heavy cost of destroying all the trees to prevent the spread of the beetle pest, signs of which soon became very evident in the decayed matter and refuse left in the trees, caused by the havoc done by the bears. It was indeed a severe hardship, though no particular fault, and I recommend the case as deserving of some compensation from Government.

Kuala Kangsar (Upper Perak).—The improvement in the unkeep of the kampongs referred to in last year's report has, I am pleased to say, been well maintained, and good progress made in this direction, and my Sub-Inspector reports that the crops were in excess of 1905.

The price obtained for the nuts was high, and in many mukims averaged as much as $4 per hundred.

Krian and Selinsing.—Very good progress has been made in the Krian district, while the extension in the cultivation is most satisfactory, and from all I can learn there is likely to be a further considerable increase in the current year.

Matang and Larut.—The general ukeep of the kampongs continues satisfactory, and although the acreage planted up was not very extensive I learn from my Sub-Inspector that now the method I have introduced for protecting the young trees from the ravages of the wild pigs has proved entirely successful,

the natives who previously lost many young trees from this cause, which has now been overcome, are most anxious to go in heavily for coconuts, so I expect to see some further extension in the cultivation in these districts.

KINTA.—With the exception of the Batang Padang district (and this will receive more attention from the Sub-Inspector during the current year) there has been a general improvement in the condition of the native holdings, and as it may be held to be mostly a mining district I consider the further increase in the cultivation satisfactory. My Sub-Inspector reports that a number of owners have put in coconut nurseries to plant up their lands immediately after the padi crop has been harvested, so I look for a further area being planted up in 1907. At Pusing Bahru, in the Sungei Trap mukim, all the trees in the locality were attacked by a small caterpillar, simply in thousands, which denuded the coconut leaves and left them in skeleton form. These attacks had the effect of the trees losing their vitality and dropping the fruit before it reached maturity. In all about 1,000 trees were affected. This happened during the dry weather. Although particular attention was given to the trees and all the rubbish burnt in their immediate vicinity, it appeared to no good effect. As soon however, as the rains commenced an improvement set in and the pest gradually disappeared. The trees, which were considerably thrown back, are now recovering, and in six months time will, I think, come again into good bearing. Both Mr. CARRUTHERS and Mr. PRATT visited the place; the latter in his annual report describes the insect.

GENERAL CULTIVATION.—From the tenor of the foregoing remarks it will be noted that the natives throughout the State generally are giving more care and attention to their plantations, and that the interest take in their kampongs is gradually increasing. I have not been so successful as I should have desired in getting owners to plant up the vacant places and the inter-planting of young trees among the coconuts that are beginning to fall off in yield of fruit on account of age, but sufficient progress has been made to give distinct encouragement, and I hope to do more year by year in this direction by continual persuasion and the efforts of my Sub-Inspectors.

PROSECUTIONS.—As regards this I believe that instead of the small fines which are levied (and in many instances with little good) it would be more effective and better results would be attained, and this without actually necessitating any ultimate loss to the offender, if on the second time he was charged the heaviest penalty of $25 be inflicted, and that, if at the of end six months, or sooner, his kampong has been put in good order and is being properly maintained to the satisfaction of the Federal Inspector of Coconuts or District Officer, the fine of $25 be refunded to him.

State of Selangor. Staff.—In addition to the Sub-Inspectors stationed at Kuala Lumpur and Klang, another Sub-Inspector was appointed early in the year, and stationed at Kuala Selangor. The State Inspector, H. H. Davison, was retired from the service on the 31st July, and the post continued vacant during the remainder of the year.

Cultivation.—I estimate 19,216 acres as the approximate area under coconuts in the State at the end of 1906. This is only an increase of about 400 acres as compared with 1905, but the actual area brought into cultivation during the year was over 1,100 acres, 900 acres in the Coasts districts and 200 acres inland. As against this 740 acres of coconut trees were destroyed by the Europeans to make room for rubber that had been interplanted. I cannot believe that this course was a sound one, especially where there was a fair acreage of coconuts, and the trees either in, or just coming into, bearing; surely, seeing that other land was available for rubber it would have been better to have left the coconuts (and thus have two products to depend upon) and cut down the rubber.

To instance a case which happened towards the end of the year—130 acres of healthy and well grown coconuts, just coming into bearing and worth fully $275 to $300 per acre—say $36,750—were cut down to make room for some rubber, while the latter had not been planted much over a year. In the face of the fact that other land was available on the estate for rubber planting, this was, to my mind, a work of wanton destruction, which I believe the company may have in course of time good cause to regret.

Kuala Lumpur, Ulu Selangor and Ulu Langat.—The Sub-Inspector at Kuala Lumpur supervises these districts, and the native holdings are in fair order.

Kuala Lumpur.—The beetles are still very numerous and continue to infest the trees in Pudoh, Ampang and Batu mukims, where it is most difficult to eradicate them altogether, but some progress has been made in this direction. The cause is attributable to the difficulty in ascertaining all the breeding places, while the trees on abandoned land no doubt account for a good deal of the harm that arises, and a special staff of coolies is required for the destruction of these trees. At Rawang and Serendah, in Ulu Selangor, the pest has been troublesome and required continual attention, otherwise the other mukims of the district are quite free from it, as is also the Ulu Langat district.

Klang and Kuala Langat.—The native kampongs are generally improved in their upkeep. In the Klang district, between the 4th and 14th miles Klang-Kuala Selangor road, there was, I regret to say, a very numerous outbreak of beetles during

the earlier part of the year, which continued for a considerable time, and notwithstanding the strictest supervision it was quite impossible to cope with their raids altogether, or prevent a certain amount of harm being done to the trees from their attacks; however, the evil is now gradually disappearing, and the trees slowly recovering. This sudden and unusually large swarm of beetles, I am of opinion, was due to some extent to the wholesale destruction of so many trees at a time by the Europeans, as, under these circumstances, even with the greatest precautions, it is almost impossible to prevent the beetles taking some advantage of the debris left lying about before the stems can be properly destroyed; and again it may be partially accounted for by the many clearings of jungle and forest land in the vicinity, while there is always the difficulty of getting the natives to extricate the beetles from the trees that have been attacked. At Golden Hope Estate, Klang, an outbreak of "nettle grub" caterpillars, a species of Thosea, occurred in March, and many of the coconut trees were attacked, and the leaves became quite defoliated from their feeding on them. The insects disappeared suddenly in about three months' time, and, except that the trees were thrown back for a time, the harm done otherwise did not seem to seriously affect them.

KUALA LANGAT.—The plantations in this district are making good progress. Both on Jugra and Klanang Estates the trees are, for their age, giving excellent returns; on Mr. MUNRO's estate the trees are coming on very well. Mr. MUNRO is using the Indian plough for getting rid of the lalang, and has done capital work with it. This method he finds very much cheaper than coolie labour, and the results have proved equally satisfactory for its eradification, while there is no doubt turning over the soil proves most beneficial to the progress of the trees. The beetle pest gives little trouble in this district. Around Jugra itself the trees have been slightly attacked by them, but this is now entirely suppressed.

KUALA SELANGOR AND BERNAM.—I am able to report some improvement in these districts since the appointment of a Sub-Inspector. Many of the coconut plantations that were so much neglected by the natives are now being cleaned up regularly, and maintained in a satisfactory condition. The beetle pest—so prevalent before in some mukims in Kuala Selangor—is now reduced, but very strict supervision is still required to keep them away from their old haunts. The trees in the Bernam district are, I am pleased to say, very free of the beetles.

SELANGOR OIL MILLS.—About 16,000 pikuls of copra passed through their factory. About half of the copra was made on the premises, and the other half purchased from the surrounding districts—mostly from Jeram and Permatang.

STATE OF NEGRI SEMBILAN.—STAFF.—There was no change in the staff during the year.

CULTIVATION.—The approximate area under coconut cultivation at the end of the year I estimate at 17,196 acres, some increase over the preceding year, although, owing to the large number of fruit and other trees interplanted in the kampongs, there is only an average of about 30 trees to the acre.

SEREMBAN AND JELEBU accounts for most of the increased area planted out during the year. The native holdings in the district are on the whole well maintained.

KUALA PILAH.—The beetles have been well suppressed, but the kampongs throughout the district would still be the better for more care and attention from their owners.

TAMPIN.—The upkeep of the coconut plantations shows some improvement, and the beetles that appear from time to time in the mukims of Selemok, Tanjong Kling, Bongit and Chengkau have been effectively dealt with.

COAST DISTRICT.—The majority of native holdings are cleaned up at regular intervals, and are receiving more attention from the owners.

OTHER PESTS.—I regret to say that bears made their appearance and did considerable damage in the mukims of Sungei Raya and Linggi. Steps were taken to get rid of them, and although I have not heard that any of them have been shot, I have been informed that they have been quite frightened away, and not done any further damage.

The Sub-Inspectors report that pigs have given a good deal of trouble in Seremban, Kuala Pilah and Tampin, but from the present method that I have lately adopted for dealing with this pest I do not anticipate much trouble in the future from this source.

The squirrels were neither so numerous nor doing so much damage to the trees as was previously the case.

STATE OF PAHANG.—The two Sub-Inspectors—who are stationed at Pekan and Kuantan respectively—report that good progress has been made in the districts which are under their charge, and although the area under coconut cultivation did not show much increase during the year under review the general condition and upkeep of the native holdings are much improved, while the beetle pest has been well suppressed, though I regret that while at Pekan I again found the Sultan's plantation very much neglected. I made a visit of inspection throughout Raub, Bentong and Kuala Lipis in the month of May, and again a further tour down the river between Kuala Lipis and Pekan, and

from there proceeded to Kuala Pahang and Kuantan during the months of July and August. I was pleased to find a very marked improvement in several of the mukims, and that in the absence of my Sub-Inspectors many of the Penghulus saw that the kampongs were afterwards well maintained. Something too has been effected in persuading the natives to plant up the vacant places with young trees.

The squirrels as a whole are not nearly so numerous or doing so much harm as they previously did.

The *dry* disease referred to in my last report seems fortunately to be gradually disappearing; the trees in the plantation which I experimented upon have recovered from its effects, directly indicating that with proper care and attention, even after the disease shows itself, it can be to a great extent effectually treated.

Mr. DUFF's plantation at Kuala Pahang, which I visited during my tour, is entirely neglected now, and there is no one in charge of it or any coolies retained for its upkeep. Unfortunately a fire had occurred on the evening of the day previous to our visit. The fire evidently started from the Chinese plantation of 80 acres just above, and after passing over the whole of this area continued its course over about 150 acres of Mr. DUFF's estate. The damage done is very considerable. I should say some thousand trees have been destroyed beyond recovery, while several thousand have been retarded very much in their growth and will take a year, if not more, to come round.

At the AGRI-HORTICULTURAL SHOW, held in Singapore about the middle of August, there were, as at the two previous shows, a great many fine exhibits of coconuts, and though the Straits were well represented, the Federated Malay States again succeeded in carrying off the highest awards in this section.

PROSPECTS.—Although it is gratifying to be able to state that coconut planting still finds a certain amount of favour among the native community, the further extension of the cultivation is not so promising or making the strides, which with greater facilities from Government, it might do. Considering the enormous profits that assumingly will ultimately from the culture of Para rubber, it is not surprising that those interested in it regard with equanimity the material rise in the quit-rent introduced in 1905, which naturally comes about as a consequence. At the same time there is not the slightest doubt that this higher rate has proved detrimental as regards the extension of other products, and the cultivation of coconuts has unfortunately fallen within this category.

Under the circumstances, and recognising the very great importance of a mixed cultivation of products throughout the States, as far as possible, I am of opinion that it is a matter that deserves to receive further consideration from Government.

It will not, I think, be denied that for a sound, solid and what may fairly be regarded as a safe remunerative investment (though quite out of range of the anticipated large profits from Para rubber) coconuts, as a tropical product, are hard to beat, and for this reason alone their culture might well be fostered.

I have already alluded to the value of the coconut industry in the States where the soil and climate are so eminently suited, but for the more rapid development of the cultivation, it is, I consider, really necessary that Government should do all they can to encourage Europeans to interest themselves in it and so attract influence and home capital for the purpose.

On this account it is most advisable that for land given out for coconut cultivation the old rate of $1 per acre for quit-rent be reverted to. I am assured that at this rate many applications will immediately be made by the Europeans to take up land for planting coconuts, while I am led to believe that the more prosperous of the native community, who are in a financial position to take up and cultivate larger areas than 10-acre blocks, would do so to some extent if the above change is effected.

The most favourable sites for coconuts undoubtedly are in proximity to the Coasts all along Perak and Selangor, and I feel sure it would be a wise policy for Government to reserve these areas as far as possible for coconut planting, there being no real necessity to alienate this land for rubber cultivation, as there is plenty of land equally suitable for rubber (but not for coconuts) in abundance in other parts of the States.

Under these more favourable conditions I feel confident that a much increased area must come under coconut cultivation, year by year, than would otherwise be the case, and that with a more extensive acreage perhaps before long some other important interests of the industry, as exemplified in Ceylon, may be introduced into the States.

L. C. BROWN,
Inspector of Coconut Plantations, F.M.S.

REPORT OF GOVERNMENT ENTOMOLOGIST FOR THE YEAR 1906.

I assumed the duties of this office on 15th September, 1906. As part of these three months has been necessarily occupied in arranging the laboratory and ascertaining the conditions under which work has to be conducted, the report must necessarily be very brief. A few excursions of two or three days duration have been made on agricultural work. The results, such as could be obtained in two short trips, are given below.

Kuang Padi Pest.

On 12th and 13th December, in company with Mr. Glover, Assistant District Officer, I visited Kuang to investigate a padi pest which had been reported to this department as having ruined the padi, and I have the honour to report as follows:—

A cultivated area of approximately 50 acres, situated about one mile from Kuang Station, has been almost completely destroyed by apparently the larvæ of several insects. The serious damage is, however, caused by the larva of "Nonagria (Sesamia) inferens. Wlk." of the family Noctuidæ, the others, though numerous in species, were causing but little harm.

In parts the virulence of the disease is much more marked than in others; local areas badly affected resembling a field of cut hay. During December, the adult insects were almost ready to emerge, numerous adult larvæ being obtained. The eggs were not found, but it is probable that at any rate these are laid chiefly on the young padi, and during August or September. The young larvæ bore through the leaves covering the stem, and usually make their way into the hollow portion of the latter. It is here they commence their destructive work, usually working downwards and eating away the part surrounding the hollow portion of the stem. When the larva reaches to within about 4 inches of the ground the stem falls over and withers, and the great numbers so affected give the field the appearance mentioned above.

In about 20 per cent. of the specimens gathered, pupation had taken place below the water, and these were always found in a putrefying condition. This no doubt is due to the percolation of the water through the epidermis of the stem, which had for a short time (perhaps while pupation was taking place) proved sufficient protection from the water, but which subsequently rotted. In the rest, pupation was above water and as many as ten pupæ were gathered in a single stem.

I was unable to find any adult specimens of the pest, probably it was too early in this month to obtain them. They are, however, with difficulty disturbed, being essentially night fliers.

A species of bug (*Leptocorisa acuta Thunb*) was observed in the field in great numbers, and on inquiring from the natives I was informed that the ripening padi is sometimes injured by this insect.

It attacks the plant by inserting its proboscis into the young fruit and sucking out the juice. On mentioning this to the Director of Agriculture, and showing him the insect in question, he recollected that in Ceylon a sort of tray, with a long handle, was used to collect this same insect, by sweeping over the padi with this tray early in the morning. This implement is being made, and next year the natives will be encouraged to use it. It also

seems highly probable that there is a root disease amongst the padi, and it is of importance that this be investigated during 1907. The time of year I visited Kuang, and the cursory examination I was able to give the disease renders it impossible to state with certainty whether such is the case. I am of opinion that, when more attention has been given to the irrigation of the padi, the disease will greatly decrease.

Sharply defined areas that are badly attacked are coincident with patches that are below the true level of the field, and in these depressions the water remains behind, becoming stagnant when other portion of the field is dry.

Remedial and Preventive Measures.

With regard to remedial measures two things are important

First, all padi in any way affected should be burnt. There are many small areas at Kuang in which every plant is dead, and in all these there are numerous larvæ and pupæ; these should be destroyed.

The plants could be collected and burnt (care being taken to take up the roots of at any rate drier plants), or a preferable plan would be to gather in what fruit is left and the whole area burnt.

Secondly, depressed areas should be thoroughly dug up, the ground burnt over, lime mixed with it, and then levelled as far as possible. Stagnant water should not be allowed to remain on the field.

As before mentioned the eggs are presumably laid in August or September. This being the case I would suggest that all padi, at any rate in the infected district, be planted towards the middle of April in order to avoid the larval stage of this pest. Direct observation for some months is necessary before I can state with certainty that this last suggestion will be effective as I am not yet aware how many broods a year this insect has.

I regret that this matter was not reported to this department before, as I learn from the natives that the disease appeared some three months ago for the first time. The probable reason for this delay is that this larva (as in many species of this family) has concealed habits, often attacking the roots and the lower part of the stems, and it is not until a considerable amount of the crop is lying dead on the field that any disease is suspected by the natives. The insect has by this time thoroughly established itself, and in the case at Kuang further destruction is inevitable, and the whole field had better be burnt. I would urge the District Officers to endeavour to make the native understand the importance of careful observation and cultivation of their crops in order to detect any disease in time, and that the earliest observation of a pest be sent to this department.

Description of Larva and Pupa.

Nonagria (Sosamia) Inferens Wlk.—The larva on its under surface is of a whitish-yellow colour, and the upper has a somewhat pink reflection in most specimens.

The head is brown (sometimes darker), sub-quadrate in shape, and has a medium dorsal impression forming a Y.

The anterior and posterior portions of the body bear some stiff outstanding bristles. Segments 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, and 11 each bear a pair of elongate spiracles placed vertically and black in colour.

There are three thoracic legs, and four abdominal prolegs. The latter are borne on segments 6, 7, 8 and 9, the anal segment bears the anal prolegs.

The length of the larvæ vary from $\frac{1}{2}$ to $\frac{7}{8}$ of an inch. There is little to be said of the pupa. It is usually of a whitish-yellow colour (darker towards the anterior portion) when it first changes to this stage. Later it becomes darker. It is of cylindrical form, and the posterior part being obtusely pointed. It varies in size to about the same proportion as the larva.

About 10 per cent. of the pupæ gathered were parasitised. One of the parasites is a small Chalcid and the other one of the Ichneumonidæ.

A Defoliation of Coconut Trees.

On 11th October, with the Inspector of Coconut Plantations, I visited Pusing Bharu, Batu Gajah district, with the object of examining the coconut trees which had been defoliated by lepidopterous larvæ during March and April of this year.

The eggs, larvæ, pupæ and moths, which had in two months been present in great profusion, were, when I visited these plantations, very scarce, and the few notes which I could collect are here given.

The coconut leaves were mined in a longitudinal manner, and as many as 40 vacated pupa cases were observed on one leaf. These cases are of a silky-white colour, depressed and ovoid in shape, and invariable on the under side of the leaf where the larvæ feed.

A few larvæ were found and these taken in the hope of rearing them, but as I was unable to give careful attention to them they died. I therefore cannot say what the adult insect is, but it is probably one of the Iortricidæ. According to the owner of the plantations this same disease appeared some seven years ago,

and not since then until now, and as far as I can see there is little probability of it occurring again next year, even though numbers of these moths must have hatched and laid eggs. A sharp look-out should, however, be kept for its first appearance, and information forwarded to the Department of Agriculture directly it is noticed.

If, as the owner stated, the virulence of the disease was as bad seven years as during the present year, it seems likely that there are other food plants on which the larvæ feed.

This, of course, entails careful observation for some time, but should such prove to be the case, the preservation or cultivation of the food plant or plants would assist in preventing this insect's attacks, these plants being used as traps.

The more probable reason, however, for the appearance of this insect at considerable intervals is that a disproportion may arise between the insect and its parasites.

During one year the eggs of the insect may have been parasitised to a large extent, and consequently a far greater number of parasites will appear than the true insect itself. The parasite, as it gradually gains the upper hand, will decrease in number on account of the greater rarity of food. Hence in the course of time the latter is reduced to a small number, and the pest again has the opportunity to increase in individuals, and will do so until its destroyers again gain the upper hand. I think it is not unlikely that 60 to 70 per cent. of the eggs from a large brood are parasitised. At present the long intervals between the attacks of this larva renders the harm done of no great importance, unless the fruit is subsequently injured by the defoliation of the trees.

Description of Larva.

The larva is a small creature, the length of the specimen I have being 8 mm., *i.e.*, $\frac{1}{3}$ in., and is probably nearly adult. It consists of 13 segments, the three thoracic each bearing a pair of legs. The 6th, 7th, 8th and 9th abdominal segments each bear a pair of prolegs and the last the anal prolegs.

Head and first two thoracic segments ochraceous; mandibles dark brown; 2nd thoracic segment has a few dark stripes on it, but they vary in size in different individuals.

Abdomen below luteous, lateral margin of the same of a light greenish-yellow. Dorsal surface of abdomen with a longitudinal blue facia, commencing at apex of 3rd thoracic segment, and terminating at base of the 10th. A large median spot on the 12th, a small lateral spot on each side of the 11th, a spot on each side of the 3rd, and a spot (somewhat smaller) on each side of the 4th dorsal segment of the colour as the facia. Radiating from the

sides of body, thorax, and head are single long hairs. Each segment, except the first thoracic and the anal, bear on either side four clusters of bristles.

The spots on the sides of the 11th and 4th segments are sometimes more like stripes.

H. C. PRATT,
Government Entomologist, F.M.S.

REPORT OF GOVERNMENT CHEMIST FOR THE YEAR 1906.

I arrived in Kuala Lumpur and assumed the duties of my appointment on the 18th June.

Some time was occupied in the equipment of the present chemical laboratory in order to carry on investigations for the above department pending the completion of the laboratory in the buildings now being erected.

The equipment of the new laboratory has also been almost completed, in readiness for agricultural chemical investigations, especially in connection with the rubber industry, which will have of necessity to be conducted in the vicinity of the experimental rubber plantation.

Manufacture of Carbon Bisulphide.

My attention has been directed chiefly to the problem of the manufacture of carbon bisulphide in an apparatus that might be utilised on the various estates without expert supervision. The efficacy of this valuable insecticide for more pests, including the destructive white ant, for which it is principally required here, has already been proved, but the great objection to its use in this country is the cost of shipping the liquid, owing to precautions which must be taken on account of its great volatility and inflammability.

The problem had already been commenced by the Director of Agriculture before my arrival with an apparatus devised by him in conjunction with Mr. Kelway Bamber, Government Chemist in Ceylon.

Carbon bisulphide is a compound of carbon and sulphur analogous to carbon dioxide, but liquid at ordinary temperature, and its preparation consists essentially in passing sulphur vapour over red hot carbon (usually in the form of wood charcoal) in the absence of air or oxygen in long iron or earthenware retorts, and condensing the gas which is evolved.

An exhaustive series of experiments have been carried out at different times, and under varying conditions, with the apparatus, using different fuels in the furnace, *e.g.*, coal, coke, and charcoal, or mixtures of these.

The chief difficulty, which it is hoped may eventually be surmounted, is the regulation of the requisite temperature in the retorts. A sufficiently high temperature must first be obtained to start the reaction, and secondly this temperature must not be greatly exceeded otherwise the carbon bisulphide will be again broken down. Till the present time, both in the original apparatus and in modified forms of this apparatus, the necessary conditions have not been obtained.

Experiments are still being carried on, and recently an earthenware retort has been tried, as the corrosive action of the sulphur on the iron retort at the elevated temperature used, was found to disintegrate the latter completely in a very short time.

In the event of this small field retort and furnace being unsuccessful, either a large plant will have to be erected for the production of this insecticide, on the same principle as those at present in vogue, or the liquid will have to be imported for agricultural purposes; the latter method has many disadvantages and there is no reason why the compound should not be successfully manufactured here if necessary precautions are taken.

Effects of Arsenical and Sulphur Fumes from Tin Roasting Furnaces on Vegetation.

The effects of arsenious acid on the root or stems of a plant immersed in a solution of the acid is said to be similar to that of hot water, the foliage turns a brown colour and rapidly withers. Plants grown in earth containing arsenic are said to only take up minute quantities, and the toxic effect is negligible. The principal effect of arsenical fumes from factories on vegetation is that of defoliation.

In order to demonstrate definitely the effects of the noxious fumes, chiefly arsenious acid and sulphur dioxide, in the fumes from the tin roasting furnaces in these States, a small model furnace (about quarter of the original size) has been erected by the Director of Agriculture in the grounds of the Institute for Medical Research, and a long atap shed, open at both ends and standing on long poles, has been added for experimental observations.

In this furnace low grade tin ores containing high percentages of mispickel (arsenical iron pyrites) are to be roasted,

and the fumes evolved will pass through the long atap shed mentioned above, in which a number of young plants of Para rubber (*Hevea braziliensis*), Rambong (*Ficus elastica*) and Inga saman (*Pithecolobium saman*), grown in pots, are placed at intervals. The ore will be completely calcined and the effect on the plants studied pathologically and otherwise.

If possible, the furnace gases will be analysed to ascertain the percentage of arsenious acid and sulphur dioxide.

I am of opinion that the sulphur dioxide in the fumes from the furnaces working in the various parts of the States causes the greater amount of damage to vegetation, especially at a distance from the furnaces, as it is widely dispersed by prevailing winds, whereas the arsenious acid would be rapidly condensed after its exit from the furnace chimney.

To demonstrate the correctness or otherwise of this view, attempts are being made to condense the arsenic in the experimental model furnace and allow only the sulphur dioxide to escape.

The furnace and accessories for carrying out this investigation are now complete and the results will be embodied in the report for 1907.

Laboratory Investigations.

Owing to the non-equipment of the laboratory in the Institute for Medical Research for agricultural chemical investigations and the lack of apparatus till quite recently, no experiments such as soil or rubber analyses or investigations of the agricultural produce of this country have so far been undertaken.

Anti-Opium Drug.

Preliminary experiments were carried out with samples of the drug now being distributed in various parts of the States for curing the opium habit. Samples of the decoction prepared from the plant used, and a number of specimens of the plant were received, when the anti-opium movement first commenced on a large scale in Kuala Lumpur. The plant is Combretum sundaicum, a member of the natural order Combretaceæ, to which family belongs the genus Terminalia, some species of which are used for their tanning properties. The drug, which is essentially an extract of the leaves and twigs of the plant, first roasted in shallow iron pans over charcoal fires, and then boiled in a definite volume of water and evaporated to a known volume, is found to vary somewhat in composition, and samples I have

received have contained residues varying from 0·1 to 0·6 per cent. This variation would be expected, when the empirical manner in which the drug is prepared, and the variation in the age of the leaves and the amount of extractive matter taken from them in the process of boiling, is taken into consideration.

Preliminary observations have not shown the presence of any alkaloidal, glucosidal or other bitter principles. The organic matter consists principally of tannin, which is probably the active constituent, but I have been unable to estimate the latter owing to lack of apparatus and chemicals till recently. The explanation of the physiological action of the drug as an anti-opium cure is somewhat difficult. Tannin is a precipitant of morphine and other opium alkaloids, but very small quantities of these alkaloids, if any, are absorbed into the system when opium is smoked. The effect of the drug on an opium eater might be as a precipitant of the alkaloids in the stomach before absorption, thus rendering them insoluble. If this explanation is valid, any other tanning solution, *e.g.*, strong tea, or solution of gambier, cutch, etc., might be substituted for this drug.

Hydrocyanic Acid in Plants.

Some preliminary experiments have been carried out to ascertain whether the cyanogenetic glucoside known to be present in the seeds of the Para rubber plant (*Hevea braziliensis*) was also present in the leaves and other parts of the plant.

Leaves and twigs were examined separately by maceration in cold water and by hydrolysis with dilute mineral acids. In each case, appreciable quantities of prussic acid were obtained from both leaves and twigs by decomposition of the glucoside, one specimen yielding 0·08 per cent. of prussic acid. The plants from which the leaves were obtained were planted in 1905.

It is proposed to continue the experiments with young plants of different ages, to ascertain the variation in the amount of glucoside at different stages in the plant's growth.

These glucosides have now been insolated from a number of plants, and their presence indicated by the production of prussic acid hydrolysis from many other plants from which the glucoside have not yet been actually isolated.

An excellent résumé of the subject is given in the "Bull., Imperial Institute," Vol. IV, No. 4, 1906, which contains the valuable investigations of Dunstan and Henry and of Treub.

B. J. EATON,
Government Chemist, F.M.S.

GOW, WILSON & STANTON, LIMITED—
India Rubber Market Report.

13, Rood Lane, London, E.C.,
August 9th, 1907.

At to-day's auction, about 843 packages of Ceylon and Malaya Plantation grown rubber were under offer, of which, about 427 were sold.

The auction having been postponed until after the holidays, offerings were rather larger than usual, the total weight amounting to 45 tons, Ceylon contributing over 10, and Malaya about 35 tons.

Competition was in most instances somewhat irregular, and a decline of about 1*d*. to 2*d*. per lb. was recorded for the finer grades, except in the case of a few lots showing particularly attractive quality, which were well competed for, and sold up to 5/10 per lb.—this price being realised for some Ceara biscuits from Rangbodde Estate.

There were a few parcels of finer crepe than has recently been offered at auction, and 5/8 was paid for one lot of very even pale colour.

Most of the unwashed scrap found buyers at prices showing little change on last rates.

TO-DAY'S QUOTATIONS.

Sheet, etc.

Fine Amber Sheet	5/3½ to 5/4¼
Dull Sheet	5/2¾ to 5/3
Ceara Biscuits	5/- to 5/10
Fine Palish Biscuits	5/6
Fine Biscuits	5/3½ to 5/4¾

Crepe.

Fine Pale	5/4 to 5/8
Palish to darkish	4/8¼ to 5/1
Dark	3/6 to 4/6¼
Darkish and Dark Block	3/8½ to 4/9½
Rambong Block	4/-

UNWASHED SCRAP.

Fine	4/1 to 4/3
Fair to medium	3/9 to 3/10½

PLANTATION AVERAGE, AND COMPARATIVE PRICES.

AVERAGE PRICE OF CEYLON AND MALAYA PLANTATION RUBBER.

To-day	427 pkgs.	4/10¾
Corresponding sale last year ...	161 pkgs.	5/6

PLANTATION.		HARD FINE PARA.
Fine.	Scrap.	
5/3 to 5/10	3/9 to 4/3	4/9½
5/8 to 5/9¼	4/– to 4/8	5/2

Particulars and prices as follows:—

CEYLON.

MARK.	PKGS.	DESCRIPTION.	PRICE.
Arapollakande	12	Fine biscuits ..	bought in.
	1	Good ,, ..	bought in
	4	Darkish and dark block ..	bought in
Glencorse	2	Rough biscuits ..	bought in.
	4	Scrap and rejections ..	3/9½.
Culloden	10	Pressed crepe ..	4/6 to 4/6¼
	1	Darker ,, ..	3/11..
Heatherley	13	Pressed crepe ..	4/5½.
	2	Black ,, ..	bought in.
KM	4	Dark ,, ..	4/5½.
	2	Black ,, ..	bought in.
	5	Scrap and rejections ..	bought in.
	2	Dark ,, ..	bought in.
Hattangalla	2	Good biscuits ..	5/4¾.
	1	Pressed crepe ..	4/5¾.
Ellakande	3	Brown pressed crepe ..	4/6¼.
	1	Black ,, ,, ..	bought in.
J J V & Co.	2	Dark block ..	bought in.
A	2	Rambong ..	bought in
	1	Dark pressed crepe ..	bought in
	4	Lump scrap ..	bought in
Ambatenne	2	Good biscuits ..	5/3¾.
	1	Good scrap ..	4/2½.

Mark.	Pkgs.	Description.	Price.
Sorana	4	Good biscuits	5/3¾ to 5/4.
Waharaka	2	Scrap	4/1.
Gonakelle	2	Very fine biscuits	5/6
	1	Good scrap	4/1½.
	1	Lump ,,	4/1½
Rangbodde	2	Very fine pale Ceara biscuits	5/10
	1	Fine Scrap	4/1½.
Tallagalla	2	Good biscuits	5/4.
	2	Good and medium scrap	4/1
	1	Earthy scrap	3/10.
	1	Rejections	3/10
Taldua	2	Good biscuits	5/4
	1	Fine scrap	4/1
Palli	9	Good Ceara biscuits	5/-
Densworth	2	Good biscuits	5/3¾.
	2	Good and medium scrap	pt. sold, 4/1.
KM	1	Good block	bought in.
Poonagalla	1	Very fine pale biscuits	5/8½.
	1	Rough biscuits and scrap	bought in.
Glanrhos	6	Biscuits	5/3½ to 5/3¾.
	4	Crepe	4/4½.
Clontarf	1	Good biscuits	5/3½.
	2	Crepe	4/4¾.
	1	Darker	bought in
Veralupitiya	1	Good sheet	5/3¾
	1	Good scrap	4/0¾.
Mipitiakande	1	Biscuits and scrap	3/6.
Tudugalla	7	Pale block	5/- bid.
	2	Dark ,,	bought in
Kipitiagalla	41	Fine sheet	5/3¾.
	1	Rough biscuits	bought in.
	2	Cuttings	3/10¼.
	2	Scrap	3/9½.
	2	Wet block	bought in.
Suduganga	3	Rough sheet	bought in.

MALAYA.

Mark.	Pkgs.	Description.	Price.
P S. E	8	Fine sheet	5/4
	2	Dark block	3/0¾
L S H	3	Good to fine sheet	5/4 to 5/4½.
K	1	Fine scrap	4/1½.
	3	Scrap and rejections	3/9.
	6	Crepe	4/4½ to 4/11.
V R Co., Ltd., Klang FMS	30	Good crepe	4/11¾ to 5/-.
	6	Palish block	4/8½.
	10	Dark smoked block	bought in.
	3	Darkish block	bought in
K P Co. Ld.	8	Dark smoked block	bought in.
Highlands	14	Good sheet	5/3½ to 5/4¼.
	10	Dark block	pt. sold 4/9¼
	2	Rambong block	bought in.
	30	Good sheet	5/3½ to 5/4½.
	4	Fine palish crepe	4/9¾.
	16	Darkish to dark crepe	4/3 to 4/6¼.
	2	Rambong block	4/-.
	10	Darkish to dark block	pt. sold 4/9¼.
B & D	7	Fine sheet	5/3½.
	3	Rejections	3/11 to 4/-

Mark.	Pkgs.	Description.	Price.
E K K P	4	Good and medium crepe	3/6 to 4/10$\frac{1}{4}$.
	1	Crepe	4/-.
	2	Fine sheet	5/3$\frac{1}{2}$.
	1	Wound ball scrap	3/6.
	1	Rejections	3/8.
B M & Co.	12	Sheet	bought in.
	6	Dark heated crepe	bought in.
L C K	2	Fine sheet	bought iu.
McI	1	Rejections	3/10$\frac{1}{2}$.
	1	Dark scrap	3/10$\frac{1}{2}$.
	4	Sheet	5/3$\frac{1}{2}$.
	1	Earthy scrap	3/10$\frac{1}{2}$.
S&D	7	Good to fine sheet	5/3$\frac{1}{2}$.
S P S	2	Rejections	bought in.
	2	Dark scrap	bought in.
	1	Rejections	bought in.
	1	Scrap	bought in.
S P	1	Scrap	bought in.
	2	Biscuits	bought in.
	1	Sheet	bought in.
	2	Rambong	bought in.
Damansara	5	Darkish block	4/6.
	1	Dark ,,	4/-.
H	10	Rambong	bought in.
C M R E Ltd.	46	Good and medium crepe	pt. sold 4/8.
Shelford	2	Fine Sheet	bought in.
Linggi	39	Very fine crepe	pt. sold, 5/8.
	9	Good crepe	4/5$\frac{1}{2}$.
	8	Dark pressed crepe	bought in.
	1	Palish blocked crepe	4/6.
Bila	32	Good to very fine sheet	pt. sold 5/4.
	4	Good to fine scrap	4/2$\frac{1}{2}$ to 4/2$\frac{3}{4}$.
	5	Fine scrap	4/2$\frac{3}{4}$.
	2	Dark sheet	bought in.
	8	Good scrap	4/2$\frac{3}{4}$ to 4/3.
	6	Rejections	3/11$\frac{3}{4}$.
	5	Dark scrap	4/2$\frac{1}{2}$.
Jebong	23	Very fine pale pressed crepe	withdrawn.
	10	Fine pressed crepe	bought in.
SSBR Co Ld	11	Darkish crepe	bought in.
	6	Fine sheet	5/4.
	3	Crepe	bought in
	2	Dark pressed crepe	bought in.
K M A, Etc.	10	Fine pale blacked crepe	bought in.
B	1	Darker	4/9.
	2	Greyish	4/2$\frac{1}{4}$.
	2	Darkish and dark blocked crepe	3/9
BNS	13	Dark sheet	5/2$\frac{3}{4}$ to 5/3
	9	Dark pressed crepe	5/3$\frac{3}{4}$.
	1	Fine sheet	5/3$\frac{3}{4}$.
	5	Darker	5/3$\frac{3}{4}$
Labu M	10	Good crepe	4/9 to 5/4
	9	Darker	bought in.
	3	Crepe	4/1 to 4/5
	3	Sheet and biscuits	5/3$\frac{3}{4}$.

Mark.	Pkgs.	Description.	Price.
Batu Tiga	4	Good biscuits	.. 5/3¼ to 5/4.
	3	Crepe	.. bought in.
	1	Dark rolled crepe	.. bought in.
Petaling	15	Crepe	.. bought in.
NR	1	Rejections	.. bought in.
A M R C	6	Good and medium crepe	.. pt. sold, 4/10½.
F (S) R Co. Ld.	10	Good sheet	.. bought in
B R R Co. Ld.	10	Fine block	.. bought in.
	12	Darker	.. bought in.
	35	Sheet	pt. sold, 5/3½ to 5/3¾.
	19	Good dark block	.. bought in.

GOW, WILSON & STANTON, LIMITED—
India Rubber Market Report.

13, Rood Lane, London, E.C.
August 23rd, 1907.

At to-day's auction, about 683 packages of Ceylon and Malaya Plantation grown rubber were under offer, of which, about 219 were sold. The total weight amounted to about 36½ tons. (Ceylon nearly 7 tons, and Malaya and Sumatra over 29½ tons.)

These offerings met a somewhat irregular demand, and a rather large proportion was withdrawn for want of competition.

Prices generally marked a decline of 1d. to 2d. per lb. for Sheet and Biscuits on last sale rates, but there were some rather more attractive parcels of Crepe included than has lately been the case, and these were well competed for up to 5/5½ for the palest.

The highest price of the auction was obtained for some fine Lanadron Block, part of which sold at 5/6 per lb.

Fine pale Ceara Biscuits were again enquired for, but competition was less animated, and 5/5 was the highest price realised for these kinds against 5/10 at the last sale.

In sympathy with other grades, unwashed scrap was also somewhat easier.

TO-DAY'S QUOTATIONS.

Sheet, etc.

Fine Sheet	5/2 to 5/3¾
Dull Sheet	5/1
Ceara Biscuits	5/- to 5/5
Fine Biscuits	5/1¼ to 5/3½

CREPE.

Fine Pale	$5/4$ to $5/5\frac{1}{2}$
Palish to darkish	$4/8$ to $4/11\frac{3}{4}$
Dark	$4/-$ to $4/3\frac{3}{4}$
Fine Block	$5/6$

UNWASHED SCRAP.

Fine	$4/-$ to $4/0\frac{1}{2}$
Fair to medium	$3/9\frac{1}{2}$ to $3/11$

PLANTATION AVERAGE, AND COMPARATIVE PRICES.

AVERAGE PRICE OF CEYLON AND MALAYA
PLANTATION RUBBER.

To-day	219 pkgs.	$5/0\frac{1}{8}$
Corresponding sale last year ...	189 pkgs.	$5/3\frac{3}{4}$

Plantation.		Hard Fine Para.
Fine.	Scrap.	
$5/1$ to $5/6$	$3/9\frac{1}{2}$ to $4/0\frac{1}{2}$	$4/8\frac{3}{4}$
$5/9$ to $5/10\frac{1}{2}$	$3/-$ to $4/6$	$5/2$

Particulars and prices as follows:—

CEYLON.

Mark.	Pkgs.	Description.	Price.
Clontarf	1	Black crepe	.. bought in.
	2	Biscuits	.. bought in.
	2	Medium crepe	.. bought in.
Gikiyanakande	6	Very fine pale worm	.. bought in.
Ingoya	5	Fine pressed sheet	.. $5/1\frac{1}{4}$.
	1	Good pressed scrap	.. bought in.
	1	Dark pressed scrap	.. bought in.
Culloden	3	Dark crepe	.. $4/1\frac{3}{4}$.
	2	Dark block	.. bought in.
	6	Darkish pressed crepe	.. $4/3\frac{3}{4}$.
Langsland	12	Fine biscuits	.. $5/2\frac{1}{2}$ to $5/3$
	1	Good scrap	.. bought in.
KM	3	Palish block and scrap	.. bought in.

Mark.	Pkgs.	Description.	Price.
Arapollakande	12	Fine biscuits	.. 5/3 to 5/3¼
	1	Fine dark biscuits	.. bought in.
Warriapolla	6	Good to fine biscuits	.. 5/1¼ to 5/3
	1	Dark scrap	.. 4/-
Sorana	14	Good to fine biscuits	.. 5/2 to 5/2¼
	4	Good scrap	.. 4/-
Ayr	1	Good sheet	.. 5/1¾
Doranakande	3	Good biscuits	.. 5/1¾
	1	Good sheet	.. bought in.
	3	Pressed scrap	.. bought in.
	2	Rejections	.. bought in.
Waharaka	1	Good biscuits	.. 5/1¾
Densworth	1	Fine biscuits	.. 5/2¼
Taldua	6	Fine biscuits	.. 5/2 to 5/2¼
	1	Good scrap	.. 4/0½
Palli	9	Dull Ceara biscuits	.. 5/2
Riverside Estate	1	Very fine pale Ceara biscuits	.. 5/4½
Gammadua	1	Fine pale Ceara biscuits	.. 5/3¼
	1	Rejections	.. bought in
Dangan	2	Good to fine biscuits	.. 5/2
Kumbukkan	4	Good to fine biscuits	.. 5/2
	1	Good scrap and cuttings	.. 4/-
Kahawattee	1	Dull Ceara biscuits	.. 5/-
Duckwari	1	Very fine pale biscuits	.. 5/2¼
	2	Scrap	.. bought in.
	1	Very fine pale biscuits	.. 5/5
Tudugalla	6	Very fine pressed crepe	.. bought in.
	2	Darker	.. bought in.
	7	Fine palish	.. bought in.
Polatagama	2	Good biscuits	.. bought in.
	1	Scrap	.. 3/11
Weoya	3	Fine biscuits pt. sold	.. 5/2½ to 5/3½
Kumaradola	4	Fine biscuits pt. sold	.. bought in.

MALAYA AND SUMATRA.

Mark.	Pkgs.	Description.	Price.
Linggi	2	Very fine pale crepe	.. bought in.
	14	Good to fine crepe	.. bought in.
	5	Fine pale greyish crepe	.. bought in.
	12	Palish mottled and pressed crepe pt. sold	.. 4/1¼
Bila	13	Good to fine sheet pt. sold	.. 5/2¾
	1	Rough sheet	.. bought in.
	9	Fine pale and palish scrap	.. bought in.
	3	Rejections	.. bought in.
	2	Dark scrap	.. bought in.
	1	Fine sheet	.. 5/3¼
Highlands	8	Fine sheet	.. 5/3¾
	3	Medium crepe	.. bought in.
	4	Good dark block	.. bought in.
	2	Darker	.. bought in.
	1	Rambong block	.. bought in.
Terentang	1	Good palish crepe	.. bought in.
	2	Medium palish crepe	.. bought in.
	3	Dark	.. bought in
	9	Fine pale and palish	.. bought in.
	2	Dark	.. bought in.
Pataling	4	Fine pale crepe	.. 5/4
	16	Palish	.. bought in.
	8	Medium and dark	.. bought in.
A M R C	3	Lump scrap	.. 3/9¾
	2	Dark pressed crepe	.. bought in.
	2	Good medium	.. bought in.
	3	Very fine pale crepe	.. bought in.

Mark.	Pkgs.	Deecription.	Price.
A M R C	5	Palish	bought in.
	1	Medium	bought in.
	4	Dark	bought in.
	2	Black	bought in.
Linsum	12	Fine palish crepe	bought in.
	8	Darkish and brown pressed crepe	bought in.
BNS Etc.	6	Sheet	bought in.
	11	Scrappy sheet	bought in.
	1	Dark block	bought in.
	7	Good sheet pt. sold	5/3
	3	Good scrap	4/-
	1	Good rejections	3/10
	1	Earthy scrap	1/4
Matang	7	Fine sheet	bought in.
	2	Scrappy sheet	bought in.
	3	Scrappy sheet, etc.,	bought in.
	3	Good scrap	bought in.
V R Co., Ld. Klang FMS	1	Fine pale crepe	5/5½
	3	Darkish	bought in.
	6	Fine block	bought in.
	7	Palish opaque block	bought in.
	20	Darkish and dark block	bought in.
	15	Good crepe	bought in.
	1	Medium	bought in.
	5	Fine darkish block	bought in.
	9	Dark	bought in.
S R Co.	12	Fine sheet	5/2¼ to 5/2½
	1	Fine palish mottled crepe	4/11¾
	21	Good to medium pt. sold	4/6¼
R S R	14	Fine sheet	5/2
	2	Rejections	bought in.
	1	Lace scrap	bought in.
L S H	1	Fine sheet	5/2
K P Co., Ld.	4	Fine sheet	5/2
K	6	Good crepe	4/8 to 4/10½
	4	Darker	bought in
K P & Co., Ld.	5	Fine palish sheet	bought in
Shelford	2	Good sheet	bought in.
Beverlac	10	Good to fine sheet	5/1 to 5/2
	3	Scrap	bought in.
	2	Dark block	bought in.
L E Muar	60	Fine block pt. sold	5/6
Straits.	18	Greyish block	bought in.
B M & Co.	12	Fine sheet	bought in.
	6	Heated and Pressed crepe	bought in.
S P S	8	Scrap rejections, etc.	bought in.

Mark.	Pkgs.	Description.	Price.
H	10	Rambong (heated)	.. bought in.
R R SD	6	Fine sheet	.. 5/1$\frac{3}{4}$
	2	Scrappy rejections	.. bought in.
M	1	Rejected sheet	.. bought in.
	1	Earthy rejections	.. bought in.
McI	6	Uncured rejections, etc. pt. sold	.. 3/9$\frac{1}{2}$ to 4/-
M	6	Sheet	.. bought in.
B R R Co., Ld.	10	Dark block	.. bought in.
F (S) R Co., Ld.	4	Sheet	.. 5/1$\frac{3}{4}$
SSBRCo.Ld	8	Fine sheet	.. bought in.
	3	Fine scrap	.. 4/-
	4	Dark and pressed crepe	.. bought in.
	11	Dark block crepe	.. bought in
B M & Co.	1	Rejections	.. 3/8$\frac{1}{2}$
S Jebong	8	Fine rolled crepe	.. bought in.

Perak.

Abstract of Meteorological Readings in the various Districts of the State for April, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature				Hygrometer				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension	Dew Point.	Humidity.			
Taiping	..	152	82.70	94	69	25	78.50	919	..	82	..	13.19	1.80
Kuala Kangsar	..	..	82.56	95	68	27	76.89	850	..	77	..	1.38	.68
Batu Gajah	..	159	82.40	94	67	27	77.30	870	..	79	..	12.28	1.82
Gopeng	..	..	82.55	93	65	28	77.01	855	..	77	..	7.10	1.30
Ipoh	..	..	82.71	94	74	20	77.97	896	..	80	..	8.83	3.00
Kampar	..	..	80.94	92	70	22	77.92	920	..	87	..	18.59	4.15
Teluk Anson	..	..	82.91	94	68	26	77.90	893	..	79	..	3.36	.83
Tapah	..	..	82.21	94	63	21	77.17	862	..	79	..	14.27	3.65
Parit Buntar	..	..	83.69	92	69	23	78.06	885	..	76	..	5.92	3.90
Bagan Serai	..	..	83.35	92	69	23	77.89	882	..	77	..	2.65	1.10
Selama	..	..	83.09	95	68	27	77.99	895	..	79	..	15.08	3.97

STATE SURGEON'S OFFICE,

Taiping, 22nd May, 1907.

W. J. WRIGHT,

State Surgeon, Perak.

Malacca.

Abstract of Meteorological Readings in Malacca for the month of April, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Durian Daun Hospital	Barometer out of order.	155·7	81·1	91·3	73·6	18·0	81·7	1·062	69·1	91·6	N.E.	3·20	·93

Colonial Surgeon's Office,
Malacca, *22nd May, 1907.*

F. B. CROUCHER,
Colonial Surgeon.

Selangor.

Abstract of Meteorological Readings in the various Districts of the State for April, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
General Hospital, Kuala Lumpur	29·814	145·3	81·0	91·1	71·6	19·5	76·5	0·832	73·7	78	Calm	12·69	2·48
Pudoh Gaol Hospital ,,	..	..	..	..	..	..	..	..	..	..	..	6·59	1·75
District Hospital ,,	..	..	..	..	..	..	..	..	..	..	..	6·82	2·65
,, Klang	..	..	..	89·4	71·8	17·6	..	..	..	..	..	11·73	2·47
,, Kuala Langat	..	..	..	..	..	..	..	..	..	..	..	2·84	0·80
,, Kajang	..	..	..	93·6	71·5	22·1	..	..	..	..	..	11·84	2·75
,, Kuala Selangor	..	..	..	..	..	..	..	..	..	..	..	5·21	1·50
,, Kuala Kubu	..	..	..	..	..	..	..	..	..	..	..	8·18	3·00
,, Serendah	..	..	..	..	..	..	..	..	..	..	..	8·06	2·17
,, Rawang	..	..	..	91·0	70·5	20·4	..	..	..	..	..	9·76	3·90
Beri-beri Hospital Jeram	..	..	..	..	..	..	..	..	..	..	..	5·38	1·97
Saboh Bernam	..	..	..	..	..	..	..	..	..	..	..	4·21	1·12

State Surgeon's Office,
Kuala Lumpur, 21st May, 1907

V. FLETCHER,
Ag. State Surgeon, Selangor.

Pahang.

Abstract of Meteorological Readings in the various Districts of the State for the month of May, 1907.

District.		Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
				Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Kuala Lipis	...	...	...	...	93	68	19·39	...	...	...	...	...	8·07	2·28
Raub	...	...	...	...	91	68	17·32	...	...	...	...	...	6·17	1·18
Bentong	...	...	...	...	93	69	17·72	...	...	...	...	...	6·15	2·43
Temerloh	...	...	...	...	93	72	14·96	...	...	...	...	...	7·21	3·03
Pekan	...	...	...	...	92	72	12·8	...	...	...	...	...	12·89	5·32
Kuantan	...	...	...	...	92	70	17·35	...	...	...	...	...	4·96	1·15
Sungei Lembing	...	...	...	...	88	67	16·1	...	...	...	...	...	7·24	2·42

STATE SURGEON'S OFFICE,
Raub, 26th June, 1907.

W. H. FRY,
State Surgeon, Pahang.

Perak.

Abstract of Meteorological Readings in the various Districts of the State for June, 1907.

District.	Maximum in Sun.	Mean Dry Bulb.	Temperature.			Hygrometer.			Total Rainfall.	Greatest Rainfall in 24 hours.
			Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Humidity.		
Taiping	156	82·83	93	72	21	78·53	·918	82	8·85	2·98
Kuala Kangsar	...	81·28	92	72	20	76·43	·845	79	4·74	2·70
Batu Gajah	158	81·53	92	73	19	76·67	·851	79	5·14	1·38
Gopeng	...	81·53	92	63	29	76·44	·843	78	11·76	3·80
Ipoh	...	81·28	92	72	20	77·06	·872	82	11·36	2·67
Kampar	...	81·82	92	71	21	79·49	·978	90	9·66	2·33
Teluk Anson	...	81·91	92	69	23	77·63	·890	82	4·98	1·10
Tapah	...	81·86	95	68	27	77·03	·864	80	7·62	2·90
Parit Buntar	...	83·12	92	71	21	77·93	·892	79	7·18	2·42
Bagan Serai...	...	82·76	92	71	21	77·50	·875	78	8·59	2·53
Selama	...	82·29	92	72	20	77·86	·892	81	8·28	1·65

STATE SURGEON'S OFFICE,
Taiping, 24th July, 1907.

W. J. WRIGHT,
State Surgeon, Perak.

Malacca.

Abstract of Meteorological Readings in Criminal Prison Observatory for the month of June, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Mean Maximum.	Mean Minimum.	Mean Range.	Mean Wet Bulb.	Mean Vapour Tension.	Mean Dew Point.	Mean Humidity.			
	Ins.	OF	OF	OF	OF	OF	OF	OF	OF	%		Ins	Ins.
Criminal Prison Observatory ...	29·911	144·3	83·4	88·9	74·4	14·5	77·7	·872	73·9	78	N. W.	4·18	1·01

Colonial Surgeon's Office,
8th July, 1907.

T. C. MUGLISTON,
Colonial Surgeon, Penang.

Pahang.

Abstract of Meteorological Readings in the various Districts of the State for the month of June, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sum.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Kuala Lipis	...	...	...	93	68	19·33	...	...	...	...	...	11·85	2·90
Raub	...	...	...	92	67	18·20	...	...	...	...	...	6·80	2·05
Bentong	...	...	...	93·5	69	18·3	...	...	...	...	...	7·97	2·31
Temerloh	...	...	...	103	71	17·5	...	...	...	...	...	2·97	1·62
Pekan	...	...	...	90	72	14·03	...	...	...	...	...	3·28	·84
Kuantan	...	...	...	90	70	17·36	...	...	...	...	...	4·83	1·05

STATE SURGEON'S OFFICE,
Raub, 26th July 1907.

W. H. FRY,
State Surgeon, Pahang.

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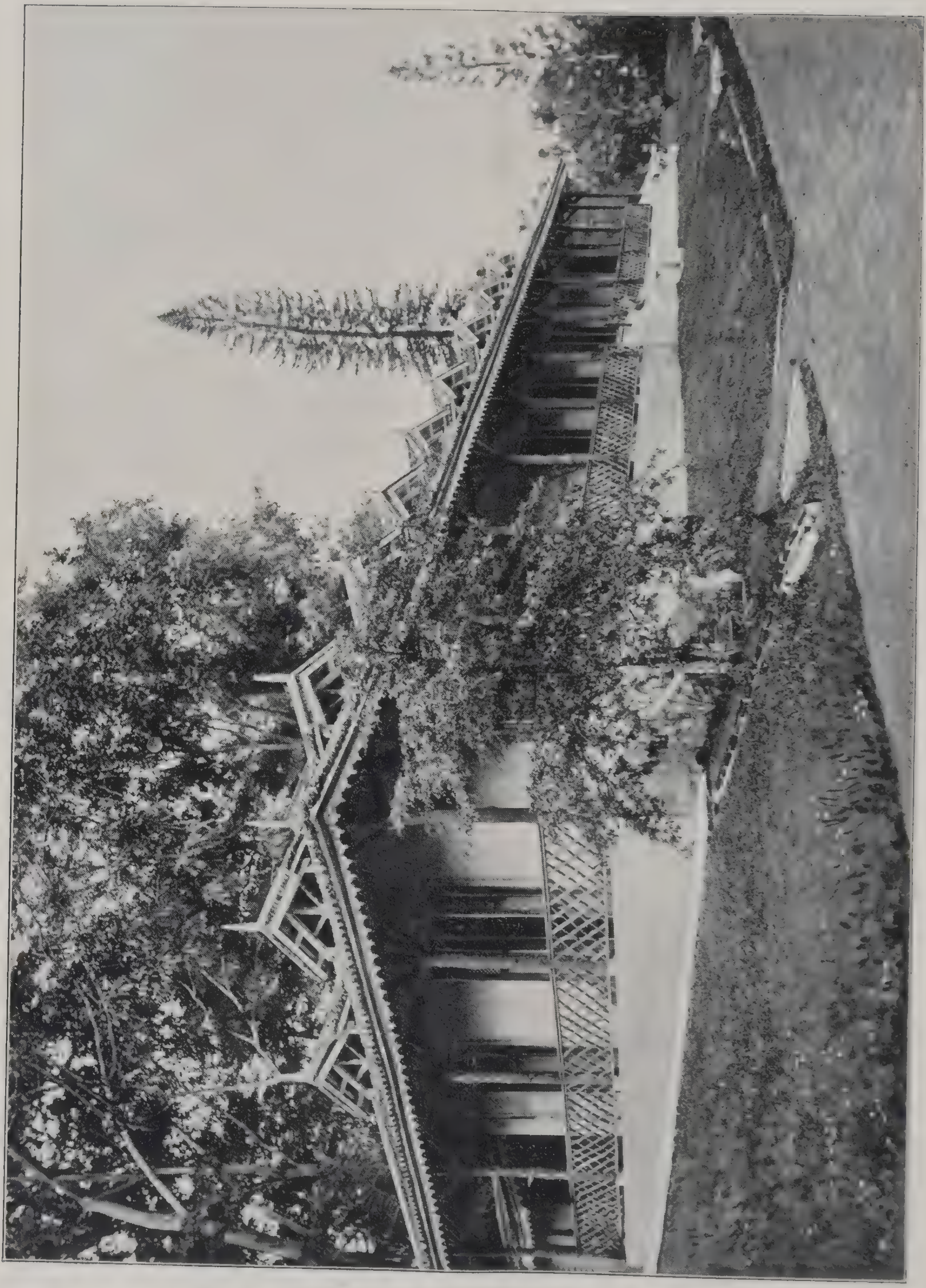

AGRICULTURAL BULLETIN

OF THE

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FEDERATED MALAY STATES.

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THE HERBARIUM.

This month we give a photograph of the Herbarium and Museum building put up in the Gardens in 1903 at a cost of $5,926.00.

The little building measures 100 feet by 28 feet, and is divided into two portions, the larger of which contains the herbarium, the smaller a collection of specimens of fibres, rubbers, dammars, rattans and other useful local products. The collection of wood specimens is also housed in this building. The pillars of the verandah and the ornamental work around it is made of branches and stems of the rough barked Tembusu tree *Fagrœa fragrans*.

The importance of forming a collection of local vegetable produce for reference and study is recognized by all Botanic Establishments and an attempt was made to obtain a suitable building as early as 1884 and at later dates but these were unsuccessful. There being no place to even store these useful products till 1903, to form an adequate representative collection such as is possessed by other Botanic Gardens was useless. Mr. JAMES COLLINS, the first Government Botanist, well known for his Report on the Caoutchouc of Commerce, made a good collection of gums and resins, rubbers, fruits, drugs, etc., which was kept for some years in the Raffles Museum, but eventually transferred to the Museum of the Botanic Gardens. Other specimens were collected later, as means was found to store them. The collection of wood specimens was commenced in 1889 and continually specimens were added, making it a very fairly complete collection of local timbers nearly all accurately identified with their scientific names.

The Herbarium was started by Mr. MURTON, the first head of the Gardens, but Mr. COLLINS had brought a number of dried plants from England, mostly from WARD'S collections and containing specimens from India and the peninsula collected by WALLICH and WIGHT as well as many European, Australian and American plants. Many of these were in poor condition and had been

somewhat neglected, but have proved useful. MURTON made collections of local plants, some of which he sent to Kew but what became of the bulk of his collection said to be a large one is not known. There were very few of his specimens to be found in the Herbarium in 1888. Mr. CANTLEY who succeeded him in 1880, commenced to form the first collection of native plants adding also specimens of those cultivated in the Gardens.

He employed a collector to visit Negri Sembilan and also collected largely himself and especially turned his attention to Ferns. He visited many parts of the peninsula including Gunong Bubu in Perak, where he obtained a number of interesting novelties. Unfortunately most of his specimens were not localized nor had the tickets supplied with them any information on them. Those of his plant collector, BREWER, however, were labelled with some account of the plant, its native name and use. The specimens were mounted on sheets of paper and kept in cabinets in a room adjoining the office. Mr. CANTLEY was no botanist and at the period but little was known of the flora of the peninsula. There had been but few plant collectors previously, and of those the most important were Surgeon-General MAINGAY and GEORGE GRIFFITH. GEORGE GRIFFITH was employed by the East India Company as Government Botanist. He arrived in Malacca in 1845 and died there in that year. During this year he continued to make extensive collections in various parts of Malacca including Mount Ophir and published a well-known work on the palms of East India and a number of his notes and rough sketches were published after his death. His collections were stored away by the East India Company in vaults in London and so neglected that many perished. The remains were eventually rescued and are at Kew, and some of his plants at the British Museum. MAINGAY was an enthusiastic amateur who collected chiefly in Singapore and Malacca. His collections were obtained by Kew. NATHANIEL WALLICH, the well-known Indian Botanist resided in Singapore at its foundation for a couple of years on his return from his Nepal trip, to recover his health, and collected plants in Singapore and Penang, and also received plants from the latter island from GEORGE PORTER, a Schoolmaster who was given charge of the Penang Botanic Gardens then at Ayer Hitam.

From these collections all made in the Colony, all that was then known of the Botany of the Malay Peninsula was derived. Nothing was known of the plants of the Malay States, and little or nothing was known of the plants which produced the rattans, dammars, rubbers, drugs or timbers of the peninsula.

The first Botanists in the Malay Peninsula were Father SCORTECHINI and KUNSTLER. The former a Jesuit priest who in his travels made an extensive collection of Perak plants. KUNSTLER was employed by the Botanic Gardens of Calcutta to collect chiefly in the Taiping Hills and L. WRAY too made expeditions in Perak and collected largely. These three collections were

istributed by the authorities of the Calcutta Botanic Gardens nd a set was supplied to the Botanic Gardens, Singapore.

It was proposed to publish a Flora of Perak based on these ollections, but it was considered advisable to add as much as was rocurable of the rest of the plants of the Malay Peninsula and iake the work more complete and useful and this was as well, as iese three collectors confined their researches to a large extent the mountain districts leaving unknown the flora of the lowlands, hich contained so many of the important timber trees of which othing was known.

Mr. C. CURTIS who arrived at Penang in 1884 and took charge f the Gardens there, was an excellent Botanist and devoted much ttention to the trees of Penang and added not a little to our nowledge of these, especially of the very important and little nown group of *Dipterocarpeæ*. A set of his plants is preserved the Botanic Gardens Herbarium in Singapore, and the study et in Penang.

Mr. R. W. HULLETT, Master of the Raffles School, made an xcellent collection of Singapore plants, obtaining many new species, ven quite close to town; so little was our flora known up to 1888. On the arrival of the present Director he munificently presented he whole of his collections to the Singapore Herbarium. The Herbarium at this time comprised CANTLEY'S collections, a few of MURTON'S plants and some of CURTIS' Penang plants, and the old COLLIN'S collection, only. The Director therefore commenced to xplore the flora of all parts of the peninsula which were accessible. The forest guards were instructed to bring in what they found in ower, and trained to preserve them. Mr. DERRY in Malacca while mployed in Forest work obtained a large series of the Malacca lants. Expeditions were made by the Director to Pahang, East Coast, Selangor, Johore, Negri Sembilan, Kedah, Kelantan, Perak nd other parts of the peninsula, partly on official business and artly on leave. The specimens were distributed to various Museums in exchange for other plants, the study set being kept t the Gardens. No attempt was made to make a general Herbarium of the world, as there was no room to store it. Only lants which would throw light on the local flora or be useful in dentifying those cultivated in the Gardens were incorporated. ndian, Malayan and Siamese plants were chiefly required, and hese were obtained wherever possible. The collection of Malay Peninsula plants is probably the best in the world, and contains number of types and co-types. Sarawak is also very well epresented by a very complete set of Dr. HAVILAND'S collection, nd duplicates of plants collected by Mr. BARTLETT, formerly Curator of the Museum there. A number of plants obtained by Mr. HEWITT, a considerable series, collected by myself in various arts of Sarawak on the occasions of two visits, and an almost omplete set of Bornean ferns collected by the Right Reverend Bishop HOSE.

Sumatra and Java are less well represented as are others of the Dutch Islands. Of Christmas Island as represented by two collections made by myself on two occasions is tolerably complete.

Cellular cryptogams are less easy to preserve though mosses keep well, in this climate. Fungi seem almost impossible to keep owing to the dampness of the climate. Marine algæ are scanty in these seas, but such as have been procurable are preserved with a number of exotic species obtained in exchange.

MALAY PENINSULA:—

Singapore—Wallich (a few), Hullett, Ridley, Cantley.
Johore—Luke and Kelsall, Ridley.
Pahang—Ridley.
Malacca—Derry, Ridley, Cantley.
Negri Sembilan—Cantley.
Selangor—Ridley, Curtis, Burn-Murdoch.
Perak—Scortechini, Kunstler, Wray, Ridley, Curtis.
Penang—Curtis.
Kedah—Ridley, Curtis.
Tringganu—Roctado.
Kelantan—Ridley, Dr. Gimlette.
Siam—Dr. Keith, Curtis.

INDIA—Wallich, Rosburgh, Hooker, Clarke, Griffith, Mann.
CEYLON—Thwaites.
CHINA—Hauce.
JAPAN—Yusun Kudo.
AUSTRALIA—Von Mueller.
BORNEO—Haviland, Hewitt, Bartlett, Bishop Hose, Ridley.
SUMATRA—Ridley, Curtis.
JAVA—Buitenzorg Gardens, Hullett.
CHRISTMAS ISLAND—Ridley.
PHILIPPINES—Merrill, Copeland, Cuming.
NORTH AMERICA—
EUROPE—Various collectors.

The difficulty of making and keeping a Herbarium in so wet a climate is not so difficult as might be imagined. There is certainly a considerable difficulty in drying plants in the forests in the wet season, especially as so many species are very fleshy, but with the aid of fire it is possible to make very fair specimens. It is essential to poison every specimen with corrosive sublimate in spirits of wine as otherwise they get quickly destroyed by the caterpillar of a minute moth, but once so treated they preserve perfectly.

It is perhaps unnecessary to dilate on the importance and value of a herbarium. It is quite impossible to do any botanical work of any kind without one, and especially that of economic botany, or forestry. In neither of these can any real progress be made

vithout specimens of the leaves, flowers and fruits of the various seful plants. Before a herbarium was made here we did not now what kind of trees produced the different timbers, native rugs, dammars, resins, or rubbers, nor could we certainly identify he plants producing them. The herbarium forms a reference eries by which not only can any useful plant be identified but we an be certain of having got the plant wanted for any purpose, by omparing specimens of it with those named in the herbarium, and an know too where it can be found when required.

H. N. R.

Export of Rubber from Para and Manaos in 1906.

The *Gummi Zeitung* gives some details about the export of Rubber from Para and Manaos in 1906:—

Grades.	To Europe.	To U. S. A.	Total.
	lbs.	lbs.	lbs.
ine	4,218,833	3,360,331	7,579,164
ntrefine	568,772	810,034	1,378,806
ernamby	1,462,769	2,481,587	3,944,356
aucho	2,177,687	694,827	2,872,514
otal Export for 1906 ...	8,428,061	7,346,779	15,774,840
,, ,, ,, 1905 ...	8,464,866	6,923,931	15,388,797

The total from Malaya during 1906 was approximately one million pounds.

The export of rubber from Para and Manaos including Iquitos mounted therefore in 1906 to 15,774,840 lbs. against 15,388,797 lbs. 1 1905, or an increase of 386,043 lbs., about one-fortieth or $2\frac{1}{2}$ er cent. In explanation of this increase it must be mentioned that 89,800 lbs. remained at the end of 1905 to be shipped in 1906, hile at the end of 1906 only 231,300 lbs. remained unshipped. It as mentioned in an earlier report on the rubber harvest of 1905-06 hat the half year, January to June, 1906, shewed an increase of 89,201 lbs. over the corresponding period of the previous year. n reference to this it may be remarked that on account of the eneral shortness of money in Para and Manaos many middle-men ersonally watched the work of rubber collecting in the forests uring the greater part of the time in order to safeguard their firms 1 Para as much as possible against pecuniary difficulties. Further e restored quiet in the collecting districts added not inconsiderably o the increase, which might have continued into the January to December period had not unrest occurred, which could not have een foreseen. While there was still an increase to record in July nd August the production decreased from then onwards until in December there was an abatement of 317,600 lbs. This unexpected

result was due to the fact that in the previous year the upper river-tributaries had in October begun to rise, while in December, 1906, they were still dried up, and navigation at a standstill.

The value of the Rubber before shipping, *i.e.*, before duty had been paid on it, probably exceeded £9,500,000.

W. J. GALLAGHER.

SCIENCE NOTES.

Fixation of Nitrogen by Leguminous Crops.

From an article entitled 'Recent Progress in the Practice of Green Manuring,' which appeared in the *Bulletin of the Imperial Institute*, the following particulars, relating to the fixation of nitrogen by leguminous crops, and the advantages of such crops for use in green manuring, have been abstracted :—

Green manuring improves soils on which it is carried out, in several ways. Vegetable organic matter is added, which not only provides plant food, but also improves the mechanical texture of heavy soils, by lightening it, and making it more open. Further, the organic acids produced in the decomposition of this vegetable matter act as solvents upon the soil constituents, and so render more material available for plant nutrition.

Probably, however, the most important advantage consequent upon green manuring is that which follows when a leguminous crop such as peas or beans is the 'green manure,' for by means of such a crop, nitrogen from the air is fixed, or converted into nitrogenous compounds, and stored up in the soil, where it is available for the succeeding crop.

About twenty-five years ago, it was ascertained, as the result of experiment, that leguminous plants were able, under some circumstances, to extract a certain quantity of nitrogen from the air, and to make use of it in their tissue building. The actual method of fixation of the nitrogen by these plants, however, was not understood until 1886, when HELLRIEGEL and WILFARTH furnished an explanation, as the result of experiments and observations made by them. They found that whilst most plants, when raised in sand free from nitrogen, ceased to grow after the reserve nitrogen contained in the seed itself had been absorbed, seedlings of leguminous plants sometimes continued to develop after passing the stage of dependence upon this reserve of food. Obviously, the nitrogen these plants daily added to their tissues was supplied by the air, since it could not be obtained from the soil. Messrs. HELLRIEGEL and WILFARTH noted however—what had not yet been remarked by other observers—that in all cases where continued growth of the leguminous seedlings did occur, nodules or swellings were to be found on the roots. It was further found that leguminous plants, germinated in sterile sand, soon ceased to grow well, but that if a little water extract of a good

cultivated soil was added, the plants recovered, formed nodules on the roots, and also became capable of absorbing nitrogen. These nodules, upon examination, were found to be full of organisms which, since the sand in which the plants were growing had been sterilized, could only have been derived from the water extract of the cultivated soil that had been added. It was concluded from these observations that the assimilation of free nitrogen by leguminous plants takes place after the formation of root nodules, which are caused by some organism present in cultivated soil.

These organisms have been isolated, and further observation has shewn that the different forms associated with different leguminous plants are all modifications of one species, to which the name, *Pseudomonas radicicola*, Beyerinck, has been assigned.

As regards the actual way in which the bacterial organism enables the plant to assimilate nitrogen from the atmosphere, since it has been proved that the organism itself, even when isolated from the plant nodule, can in certain forms, take up nitrogen, and store it up in itself as nitrogenous matter, there seems little doubt that it also absorbs nitrogen in this way when in the nodule.

The present view of the case, briefly stated, is that, firstly, the bacterium enters the root of the plant, where its originally minute form changes into a rod-like shape, multiplies, assimilates nitrogen, and stores up nitrogenous compounds, and then finally, in the nodule, the rod-like form changes to the branched form, which is ultimately destroyed by an enzyme, or ferment, produced within the plant. The nitrogenous matter is dissolved and absorbed by the plant, and the nodules gradually diminish in size.

In consequence of this power of leguminous plants to obtain supplies of nitrogen from the air, it is obvious that they are of much greater value for green manuring purposes than non-leguminous crops, as apart from adding organic matter to the soil, their growth and subsequent ploughing-in are equivalent to the application of an expensive nitrogenous manure, such as sodium nitrate or sulphate of ammonia.

It has been shewn that some soils, though capable of growing leguminous crops, are deficient in the specific organisms which enable these crops to assimilate nitrogen. As the result of a complete scientific investigation of the nature and mode of action of the organism, however, the U. S. Department of Agriculture now supply pure cultures of the bacteria in question, by which the soil of any given field, or the seed about to be sown, may be inoculated with the nitrogen-fixing organism. It is stated in the Bulletin dealing with the above investigation that the following conclusions have been drawn, as the result of the observations made by the Department: Inoculation is not likely to produce any beneficial effect upon soils which already contain the necessary bacteria, or upon soils rich in nitrogen, or again upon soils which, on account of their acidity, are unsuitable for the growth of leguminous plants. Inoculation is undoubtedly of value where the bacteria do not already exist

in the soil, or have lost their activity, as indicated by failure in the growth of leguminous crops and absence of root nodules.

H. N. R.

The Outlook for Camphor.

The following extract from the *Pharmaceutical Journal* for June 22 last, refers to the possibility of a substitute being found for camphor in the manufacture of celluloid, and to the production of camphor by synthetic processes:—

There have been rumours of a substitute for camphor in the celluloid industry, and although there may be little foundation for such rumours, there is no doubt that research in this direction has been encouraged by high prices. Then there is the problem of synthetic camphor; several processes are being worked in England, in Switzerland, and in the United States, and there is a probability that before long (provided the price of turpentine, on which these processes depend, remains reasonably normal) the synthetic product will be offered at a price lower than the present price of the natural article.

H. N. R.

THE 4TH JOINT ANNUAL AGRI-HORTICULTURAL SHOW OF STRAITS SETTLEMENTS AND FEDERATED MALAY STATES.

The 4th annual Agri-Horticultural Show was held this year at Kuala Kangsar on the 9th, 10th and 11th August. So far as beautiful surroundings are concerned no finer spot could have been selected, but the want of accommodation for Exhibitors and visitors attending the Show was severely felt, a fact which must be recognized in selecting the venues for future Shows.

Beautiful weather prevailed for the three days. The form of the buildings was to some extent similar to the Penang Show *i.e.*, three sides of a square, with a band stand and Kiosk in the centre. The shed for agricultural implements and the rubber coagulating machine were in an annexe at right angles to the building containing native industries. The Poultry were housed a little distance from the last-named shed whilst the cattle-sheds were some distance away near the river.

As was to be expected Perak shewed up magnificently and may be said to have monopolised the Show, fully four-fifths of the exhibits belonging to Perak. His Excellency the Governor accompanied by Miss. ANDERSON, His Highness the Sultan of Johore etc. amid a brilliant throng of Europeans and natives opened the Show at 11 a.m. His Highness the Sultan of Perak who spoke in Malay which was interpreted by the Resident (Mr. E. W. BIRCH) welcomed His Excellency the High Commissioner and thanked him for his

presence, he contrasted the country before the British occupation and now and said how delighted he was when he heard that the Show was to be in Perak, and that he was glad to point out the interest taken in the Shows by his people of their free will. His Excellency who spoke for about a quarter of an hour, after thanking His Highness for his kind words referred to agriculture generally and Coconuts and Rubber in particular. He also dwelt upon the labour question and the methods Government was adopting for putting it on a satisfactory basis, after a tribute of praise to the hard working Committee he declared the Show open.

Exhibits :—Speaking generally the Exhibits were of a high standard and as might have been expected the Rubber exhibited was an advance on previous Shows both as regards quantity and improved appearance and gave the Judges a difficult task in deciding the relative merits. Padi and Pulut was in strong force and shewn in a variety of bags, baskets, etc. Betel-nuts were good, as likewise were the Coconuts which were an even lot. Copra was very fair, some thirty odd lots competing, the various other classes call for no special remark except perhaps the Exhibits of Medicinal and dried plants shewn by Mr. MACHADO of Kamuning Estate, of the former some 222 varieties were shewn, the labels in most cases giving the uses to which they were put. The dried plants were also neatly arranged as were the samples of fibres put up by the same gentleman.

The Horticulture Division so far as plants and flowers were concerned was a failure, the few poor specimens that were shewn only served to accentuate the fact On the other hand the fruit was distinctly good and more particularly the Durians some of which were of enormous size, all the classes in the Fruit Section filled well.

The usual excellent collection of vegetables from Taiping Hills was again in evidence, very nicely arranged by the Honorary General Secretary Mr. T. W. MAIN.

There were a few interesting Exhibits of preserved fruits, Pickles, Chutnies and Eggs which were really very good.

Unquestionably the strength of the Show lay in the Division devoted to native Industries. In the three former Shows Perak has always been the backbone of this Division, and it was expected that on the present occasion that Perak would improve on previous efforts. An enormous number of the most beautiful Exhibits were staged, many of which found purchasers. In this Department some excellently bound books were shewn that had been done in Kuala Kangsar Gaol, as well as a miscellaneous lot of furniture, chairs, etc. made at the same place, they all shewed very careful workmanship, and large orders were booked for duplicates.

In the Division for Agricultural Implements the chief attention was drawn to the Federated Malay States Engineering Company's Exhibit, of their washing and coagulating machine, from some latex supplied by Kamuning Estate some excellent crepe rubber was

turned out in less than half an hour, and could have been ready dried and packed for shipment home in a few hours if need be.

Mention should be made of an exhibit in this Section by Mr. A. B. STEPHENS of Taiping of a corrugated iron sheet, perforated with slits on the arched or convex surface, it is designed for a covering for plant houses where light is essential without heavy rain, by having the slits on the convex portion only, and the concave left intact the latter forming water channels. Mr. STEPHEN was awarded a Diploma for his invention.

The Divisions for Cattle and Dogs were of local interest only and call for no special remark. The grand collection of Perak Elephants gathered together for the occasions however was a source of never ending admiration.

Mention should be made of a collection of Miscellaneous Exhibits from Labuan the most interesting of which were the Gongs and Metal works of very unique designs and apparently old. Many of the best specimens were secured for Raffles Museum.

W. FOX.

Rubber at the Agri-Horticultural Show.

The Rubber shewn at the Peninsular Show this year exceeded all previous Malayan Exhibitions in quantity and in quality. The Para sheet and biscuit class contained the greatest number of Exhibits, though crepe ran it close In both so many exhibits approached a high standard that the Judges found it difficult to separate the prize winners. Very little of the material, particularly in sheet and biscuit, was of that pale colour, which, according to advices from home, seems to be favoured by buyers just now. Possibly the spell of dry hot weather immediately before the Show had something to do with the prevalence of dark colour. Many Planters consider that light-coloured crepe or sheet is more difficult to produce in dry weather than at other times. Dry block was more poorly represented than the first two classes, and wet block even more so. The standard was high and the quality very uniform in dry block. The wet block exhibits were indifferent.

There was a fair number of exhibits, in the Rambong class, and, excepting the first few which were well ahead of the others, the quality was more uniform than in any other group. The Special Cup for scrap drew few competitors, probably due to the fact that notification of it was given very late. Rubbers other than Para or Rambong were very poorly represented, though the winning exhibit—crepe from Willughbeia sp.—was very good. A good collection of various wild rubbers and seeds came from the Government Gardens, Kuala Kangsar; their Ceara sheet was good in

appearance and of fair quality. There are not enough people willing to devote the amount of attention needed for collecting and experimenting on rubbers of comparatively little financial value. The Guttas were few ; the winning exhibit was a Gutta Taban.

It is extremely difficult owing to the lack of knowledge of definite criteria in rubber to separate lots differing slightly in quality.

The following table gives the points on which the Judges marked the exhibits ; the maximum of marks under each heading and the number actually awarded, which is the average of the different judges, judging by points is the fairest method but is of necessity a longer process than the rough and ready process of judging by selection, so much so that the judges were unable to complete their work on the first day. Fifty marks being the total by doubling their total competitors arrive at the percentage of the total maximum awarded to them.

It appears that most exhibits arrived late on the day before the Show opened ; this caused considerable confusion, and accounts for some exhibits appearing without numbers. It is hoped that in future there will be no grounds to make this complaint. Further it is desirable for Exhibitors sending in two or more exhibits of different merit, to label them A, B, C, etc.

The judges, the Acting Director of Gardens, Singapore, Mr. W. FOX, the Chairman of the United Planters Association, Mr. R. W. HARRISON, and the Director of Agriculture, Federated Malay States, Mr. J. B. CARRUTHERS, were assisted in their task by Mr. W. G. GALLAGHER, Government Mycologist and Assistant to the Director of Agriculture whose help hastened considerably an interesting but lengthy task.

J. B. CARRUTHERS.

LIST OF PRIZE WINNERS, RUBBER EXHIBITS,

KUALA KANGSAR, 1907.

SPECIAL CLASS.

FOR THE BEST SAMPLE OF RUBBER IN ANY CLASS IN THE SHOW.

PRIZE A SILVER CUP.

Presented by the United Planters Association.—Won by Messrs. Pears, Lanadron Estate, Muar—*Sample of dry block.*

Class 8—Para Crepe.

Exhibition Number.		Resiliency and Elasticity, Max. Marks 20.	Uniformity, Max. Marks 10.	Colour and Appearance, Max. Marks 10.	Absence of Moisture, Max. Marks 10.	Total Marks 50.
1st	...	17·5	9	9	8	43·5
2nd	...	17	9	9	8	43
H. C.	...	15·5	9·5	9	8	42
628	...	16	9	8	7·5	40·5
2105	...	15	7·5	9	9	40·5
2074	...	14	8	9	8·5	39·5
142-C	...	17	7·5	6·5	7	38
602-B	...	13	9	9	7	38
2016	...	14	9	8	7	38
252	...	14	8	8	6·5	36·5
2501	...	14	8	5	7	34
656-A	...	15·5	6	5	7	33·5
2080	...	11·5	8	7	7	33·5
656-B	...	12	7	6·5	7·5	33
602-A	...	10	8	7	7	32
2018	...	11	7	7	7	32
670	...	10	6	7	6·5	29·5
402	...	5	3	3	0	11

First Prize Silver Cup.—Presented by Lanadron Estate.
E. B. PRIOR, Golden Hope Estate, Klang.

Second Prize Silver Cup.—
B. C. N. KNIGHT, Jebong Estate, Taiping.

Highly Commended.—
B. C. N. KNIGHT, Jebong Estate, Taiping.

Class 9.—Para Sheet on Biscuit.

Exhibition Number.	Resiliency and Elasticity, Max. Marks 20.	Uniformity, Max. Marks 10.	Colour and Appearance, Max. Marks 10.	Absence of Moisture, Max. Marks 10.	Total Marks 50.
1st ...	17·5	9	8	7	41·5
2nd ...	15	9	9	8	41
H. C. ...	16·5	7·5	8	8	40
H. C. ...	15·5	9	9	6	39·5
214-B ...	16	8	7·5	7	38·5
145-C ...	17	8	7	6	38
656-C ...	16·5	9·1	7	6	38·6
68 ...	17	8	6	6	37
291-B ...	16	7·5	7	6	36·5
656-A ...	15	7 5	7	7	36·5
1508-A ...	13	8	8	7·5	36·5
2075 ...	15·5	6	6	9	36·5
139 ...	14·5	7·5	7	7	36
145-A ...	16	8	6	6	36
150 ...	15	6·5	7	7	35·5
214-B ...	16	7	7	5	35
656-B ...	14·5	7	7	6.5	35
402 ...	14	6·5	7	7	34·5
603 ...	15	7·5	5·5	6	34
1531 ...	17	6	5	6	34
1573 ...	14	6·5	6·5	7	34
145-B ...	15	7·5	6	5	33·5
479 ...	14	7	6	6	33
146 ...	15	5·5	6·5	5	32
668 ...	14·5	6	5	6	31·5
1622 ...	11·5	7·5	6	6	31

First Prize Silver Cup.—Presented by Selangor Rubber Co.
B. C. N. KNIGHT, Jebong Estate, Taiping.

Second Prize Silver Cup.—
JOHN LAMB, Bertam Estate, Province Wellesley.

Highly Commended.—
A. D. MACHADO, Kamuning Estate, Sungei Siput.

Highly Commended.—
M. MAUDE, Cicely Estate, Telok Anson.

Class 10.—Dry Para Block.

Exhibition Number.	Resiliency and Elasticity, Max. Marks 20.	Uniformity, Max. Marks 10.	Colour and Appearance, Max. Marks 10.	Absence of Moisture, Max. Marks 10.	Total Marks 50.
1st ...	17	7	8	8	40
2nd ...	14	9	8	7·5	38·5
H. C. ...	16·5	8	6	6·5	37
602 ...	15	7·5	8	6	36·5
252 ...	15	8	7	6	36
656-A ..	14	7	8	7	36
1573 ...	12	5	7	6	30
2076 ...	8	4	5	5	22
1508 ...	7	3·5	5	5	20·5
461 ...	...	...	...	...	...

First Prize Silver Cup.—Presented by Highlands and Lowlands Estate. F. PEARS, Lanadron Estate, Johore.

Second Prize Silver Cup.—

O. PFENNIGWERTH, Highlands and Lowlands Estate, Klang.

Highly Commended.—

C. T. HAMERTON, Bukit Rajah Estate, Klang.

Class 11.—Wet Para Block.

Exhibition Number.	Resiliency and Elasticity, Max. Marks 20.	Uniformity, Max Marks 10.	Colour and Appearance, Max. Marks 10.	Absence of Moisture, Max. Marks 10.	Total Marks 50.
...	15	8	8	...	31
...	15	8	8	...	31
...	16	8	6	...	30
146 ...	15	7	7	...	29
214-B ...	...	...	...	...	...
402 ...	...	...	...	...	...
2077 ...	...	...	...	...	...

First Prize.—The Lauderdale Cup.

H. M. DARBY, Vallambrosa Estate, Klang.

Second Prize.—

G. PFENNIGWERTH, Klang.

Highly Commended.—

A. D. MACHADO, Kamuning Estate, Sungai Siput.

Class 12.—Rambong in any Form.

Exhibition Number.		Resiliency and Elasticity, Max. Marks 20.	Uniformity, Max. Marks 10.	Colour and Appearance, Max. Marks 10.	Absence of Moisture, Max. Marks 10.	Total Marks 50.
1st	...	18	9	...	8	35
2nd	...	16·5	8	...	8	32·5
2078	...	15	9	...	8	32
479	...	14	8	...	8	30
609-B	...	16	7	...	7	30
67	...	15	6	...	8	29
69	...	16	5	...	8	29
461	...	16	6	...	7	29
252	...	16·5	5	...	6	27·5
1573	...	15	6	...	6	27
2208	...	15	6	...	6	27
214-B	...	14	6	...	6	26
671	...	12	5	...	8	25

First Prize Silver Cup.—Presented by Vallambrosa Estate.
O. PFENNIGWERTH, Highlands and Lowlands Estate, Klang.

Second Prize Silver Cup.—
E. B. PRIOR, Golden Hope Estate, Klang

Highly Commended.—Exhibition Number 2078.

Class 13 A.—Rubbers other than Para or Rambong.

Exhibition Number.		Resiliency and Elasticity, Max. Marks 20.	Uniformity, Max. Marks 10.	Colour and Appearance, Max. Marks 10.	Absence of Moisture, Max. Marks 10.	Total Marks 50.
	...	20	10	10	10	50
252	...	7	15	9	7	38

First Prize Silver Cup.—Presented by Bukit Rajah Estate.
A. D. Machado, Kamuning Estate, Sungai Siput.

Class 13 B.—Guttas.

Exhibition Number.	Resiliency and Elasticity, Max. Marks 20.	Uniformity, Max. Marks 10.	Colour and Appearance, Max. Marks 10.	Absence of Moisture, Max. Marks 10.	Total Marks 50.
...	10	7	9	5	31
656 ...	10	7	6	7	30
554 ...	10	6	8	5	29
552 ...	10	6	7	5	28
2079 ...	10	5	4	5	24

First Prize.—Ismail, Perak.

Class 13 C.—Scrap.

Exhibition Number.	Resiliency and Elasticity, Max. Marks 20.	Uniformity, Max. Marks 10.	Colour and Appearance, Max. Marks 10.	Absence of Moisture, Max. Marks 10.	Total Marks 50.
...	20	10	10	10	50
...	17	9	7	...	33
...	17	8	6·5	...	31·5
656-B ...	16	7	7	...	30
145 ...	16	7	6·5	...	29·5
602 ...	15	6	6	...	27

First Prize.—Presented by E. H. BRATT, Esq.
O. PFENNIGWERTH, Highlands and Lowlands Estate, Klang.

Second Prize.—JOHN LAMB, Bertam Estate, Province Wellesley.

PRIZES AWARDED AT THE FOURTH ANNUAL EXHIBITION.

Division *A.*

Agricultural Produce.

	Amount. $	c.
Class No. 1.—*Padi, best sample of any named variety*:—		
1st Prize to Mohamud bin Tukang, Krian	20	00
2nd ,, Hea Wood Estate, Sungei Siput	7	00
3rd ,, Hamad bin Awang, Krian	5	00
Class No. 2.—*Pulut, best sample of any named variety*:—		
1st Prize to Hadji Osman, Province Wellesley	10	00
2nd ,, to Penghulu Pandak Abdullah, Bagan Serai	5	00
3rd ,, to Penghulu Pandak Ibrahim, Kuala Kurau	3	00
Class No. 3.—*Pulut, best sample prepared by machinery*:—		
1st Prize to Whee Eng Bee, Penang	10	00
2nd ,, to Mohamud, Dato Kramat, Penang	5	00
3rd ,, to Penghulu Hamid bin Awang, Krian	3	00
Class No. 4.—*Rice, best sample prepared in a lesong*:—		
1st Prize to Ngah Bogok, Kuala Kangsar	15	00
2nd ,, to Mohamud Kassim, Penang	7	00
3rd ,, to Penghulu Yesop Ibrahim, Parit Buntar	5	00
Class No. 5.—*Padi, best collection of named variety*:—		
1st Prize to Ijok Mukim, Selama	30	00
2nd ,, to Kulop Abdul Rahim, Kota Lama Kiri	10	00
3rd ,, to Sidang Hamid Pongout, Malacca	5	00
Class No. 6.—*Pulut, best collection of named variety*:—		
1st Prize to Penghulu Hamid bin Awang, Krian	10	00
2nd ,, to Gula Selama, Selama	5	00
3rd ,, to Mat Esah, Kuala Kangsar	3	00
Class No. 7.—*Best collection of Padi and Pulut grown in one Mukim*:—		
1st Prize to Kulop Mohamud, Senggong, K. K.	50	00
2nd ,, to Said Yusop, Chigar Galah, K. K.	25	00
3rd ,, to Penghulu Pandak Abdullah, Bagan Serai	10	00

SECTION III.

Miscellaneous Produce.

	Amount. $	c.
Class No. 14.—*Bamboos, best collection*:—		
1st Prize to Mohamud Salleh, Perak	5	00
2nd ,, to Datoh Paduka Rajah, Perak	2	00
Class No. 15.—*Betel nuts, fresh*:—		
1st Prize to Penghulu Hassan, Province Wellesley	5	00
2nd ,, to Mat, Penang	2	00
3rd ,, to Normen, Perak	1	00
Class No. 16.—*Betel nuts, dried*:—		
1st Prize to Kung Thean Seng, Penang	3	00
2nd ,, to Rajah Basah, Perak	2	00
Class No. 17.—*Cloves, best sample*:—		
1st Prize to Mohamud bin Mohamud Salleh, Penang	5	00
2nd ,, to Mohamud Noor, Perak	2	00
3rd ,, to Mohamud bin Noor Said, Penang	1	00

SECTION III.—*Continued.*

Miscellaneous Produce.

	Amount. $	c.
CLASS No. 18.—*Coconuts unhusked* :—		
1st Prize to Sidang Idis bin Hasin, Malacca	3	00
CLASS No. 19.—*Coconuts husked* : —No award.		
CLASS No. 20.—*Coconuts, best collection* :—No award.		
CLASS No. 21.—*Copra, sun dried* :—		
1st Prize to Tan Lo Heong, Perak	5	00
2nd „ to Federal Oil Mills	3	00
3rd „ to Sidang Matgin bin Ali, Malacca	1	00
CLASS No. 22.—*Cotton "Kakabu"* :—		
1st Prize to Law Chit Mun, Penang	10	00
2nd „ to Mohamud Kassim, Penang	5	00
3rd „ to Kamuning Estate, Perak	3	00
4th „ Indut, Perak	1	00
CLASS No. 23.—*Coffee* :—		
1st Prize to Goldenhope Estate, Klang	10	00
2nd „ to Jugra Estate	5	00
CLASS No. 24.—*Fibres* :—		
1st Prize to Syed Ahmad, Penang	10	00
2nd „ to Shaik Ismail, Penang	5	00
Special to Kamuning Estate, Perak	10	00
CLASS No. 25.—*Gambir* :—		
1st Prize to Mohamud bin Hadji Said, Penang	5	00
CLASS No. 26.—*Gums and Damars* :—		
1st Prize to Datoh Pandak Raja, Perak	10	00
2nd „ to Kulop Abdul Rahim	3	00
CLASS No. 27.—*Ginger* :—		
1st Prize to Andi, Penang	5	00
2nd „ to Raja Ali, Selangor	3	00
CLASS No. 28.—*Indigo, locally prepared* :—		
1st Prize to Tan Lo Heong, Perak	5	00
CLASS No. 29.—*Mace, dried* :—		
1st Prize to Nyak Ahgum, Penang	5	00
CLASS No. 30.—*Maize* :—		
1st Prize to Unda Mat Isah, Perak	10	00
2nd „ to Datoh Pandak Raja, Perak	5	00
CLASS No. 31.—*Medicinal Plants* :—		
1st Prize to Kamuning Estate, Perak	10	00
2nd „ to Haji Hassan Ketiwa, Perak	5	00
3rd „ to Wango, Penang	2	00
CLASS No. 32.—*Nutmegs, fresh* :—		
1st Prize to Megat Hassan, Perak	5	00
2nd „ to Ngah Mohamud Lateh, Perak	3	00
3rd „ to Said Musah, Perak	1	00
CLASS No. 33.—*Nutmegs, dried* :—		
1st Prize to Mat, Penang	5	00
2nd „ to Naron bin Abdul Rahim, Penang	3	00
3rd „ to Mohamud Kassim, Penang	1	00
CLASS No. 34.—*Oil, Citronella* :—		
1st Prize to Heawood Estate, Perak	5	00

SECTION III.—*Continued.*

Miscellaneous Produce.

	Amount $	c.
CLASS No. 35.—*Oil, Lemon Grass :—*		
1st Prize to A. C. Hardoun, Penang	10	00
2nd „ to Kamuning Estate, Perak	5	00
CLASS No. 36.—*Oil, Coconut :—*		
1st Prize to Singapore Oil Mills, Singapore	10	00
2nd „ to Caledonia Estate, Province Wellesley, Penang ...	5	00
3rd „ to Syed Ahmad, Penang	2	00
CLASS No. 37.—*Oil, Teel seed :—*		
1st Prize to Kamuning Estate, Perak	5	00
CLASS No. 38.—*Oil, Castor :—*		
1st Prize to Mohamud Kassim, Penang	5	00
2nd „ to G. S. Hussain, Penang	2	00
Highly Commended, J. R Bruce, Penang		
CLASS No. 39.—*Oil, best collection Essential :—*		
1st Prize to Kamuning Estate	10	00
Highly Commended, A. C. Hardoun, Province Wellesley		
CLASS No. 40.—*Pepper, white :—*		
1st Prize to Tong Kat Pow, Penang	5	00
2nd „ to Penghulu Shin, Penang	3	00
CLASS No. 41.—*Pepper, black :—*		
1st Prize to E. R. Salisbury, Perak	5	00
2nd „ Tong Kat Pow, Penang	3	00
CLASS No. 42.—*Patchouli :—*		
1st Prize to Hadji Osman, Perak	5	00
CLASS No. 43.—*Rotans :—*		
1st Prize to Raja Ngah Abubakar, Perak	10	00
2nd „ to Mohamud Salleh, Perak	5	0c
3rd „ to Ljok, Perak	2	00
CLASS No. 44.—*Sago, pearl.* No award.		
CLASS No. 45.—*Sago, flour.*		
1st Prize to (No. 1614?):—	5	00
CLASS No. 45 A.—*Arrowroot, flour :—*		
1st Prize to Mohamud Emjana, Penang	3	00
CLASS No. 46.—*Sireh leaves :—*		
1st Prize to Ibrahim, Perak	7	00
2nd „ to Krani Kassim, Perak	3	00
3rd „ to John Lamb, Province Wellesley	1	00
CLASS No. 47.—*Spices :—*		
1st Prize to G S. Hussain, Penang	5	00
2nd „ to Mohamud Ibrahim, Perak	2	00
CLASS No. 48.—*Sugar Cane :—*		
1st Prize to Caledonia Estate, Province Wellesley	10	00
2nd „ to H. S. bin H. Salleh, Malacca	5	00
3rd „ to Nyak Abas, Perak	2	00
CLASS No. 49.—*Sugar coconut :—*		
1st Prize to (No. 473?)	5	00
CLASS No. 50.—*Sugar Nipah :—*		
1st Prize to Caledonia Estate, Province Wellesley	5	00

SECTION III.—*Continued.*

Miscellaneous Produce.

		Amount. $	c.
CLASS No. 51.—*Sugar Kabong* :—			
	1st Prize to Ahmad bin Penglima, Selangor	5	00
	2nd „ to Ngah Ahmad Garang, Perak	3	00
	3rd „ to Nalum bin Nanin, Malacca	1	00
CLASS No. 52.—*Sugar (cane), brown* :—			
	1st Prize to Caledonia Estate, Province Wellesley	5	00
	2nd „ to Towkay Ong Meah Hah, Perak	3	00
CLASS No. 53.—*Sugar (cane), white* :—			
	1st Prize to Caledonia Estate, Province Wellesley	5	00
CLASS No. 54.—*Honey in the Comb* :—			
	1st Prize to Penghulu Hassan bin Senan, Perak	5	00
CLASS No. 55.—*Tapioca roots* :—			
	1st Prize to Bahir, Penang	10	00
	2nd „ to Caledonia Estate, Province Wellesley	5	00
	3rd „ to Ali bin Penghulu Garang, Selangor	3	00
CLASS No. 56.—*Tapioca pearl* :—			
	1st Prize to Sandilands Battery & Co., Penang	5	00
CLASS No. 57.—*Tapioca flour* :—No award.			
CLASS No. 58.—*Tea* :—			
	1st Prize to Nyak Salleh, Penang	5	00
CLASS No. 59.—*Toddy* :—			
	1st Prize to Caledonia Estate, Province Wellesley	3	00
	2nd „ to K. Arrumugum, Perak	2	00
CLASS No. 60.—*Tuba akar* :—			
	1st Prize to Abdulraman, Perak	3	00
	2nd „ (No. 362 ?)	2	00
CLASS No. 61.—*Walking sticks* :—			
	1st Prize to (No. 82 A ?)	10	00
	2nd „ to Kulup Bendang, Perak	5	00
	Highly Commended, Federal Oil Mills	...	
	„ Mr. Ritchie, Perak.	...	

DIVISION *B.*

Flowers, Fruits and Vegetables.

SECTION I.

		Amount. $	c.
CLASS No. 62.—*Aroids, other than Caladiums*:—No award.			
CLASS No. 63.—*Caladiums* :—			
	1st Prize to Mr. Hughes, Perak	4	00
CLASS No. 64.—*Coleus* :—No award.			
CLASS No. 65.—*Crotons* :—No award.			
CLASS No. 66.—*Dracoenas* :—No award.			
CLASS No. 67.—*Ferns, any variety* :—			
	1st Prize to H. C. Barnard, Perak	10	00
CLASS No. 68.—*Ferns, Adiantums* :—			
	1st Prize to H. C. Barnard, Perak	5	00

DIVISION *B.—Continued.*

	Amount. $ c.
Class No. 69.—*Ferns, Adiantums distinct* :—No award.	
Class No. 70.—*Ferns, best specimen* :—	
1st Prize to H. Velge, Perak	3 00
Class No. 71.—*Marentas and Calatheas* :—No award.	
Class No. 72.—*Palms* :—	
1st Prize to Kamuning Estate, Perak	8 00
Class No. 73.—*Selaginellas* :—No award.	
Class No. 74.—*Selaginella, best specimen* :—No award.	
Class No. 75.—*Foliage Plants* :—No award.	
Class No. 76.—*Foliage plants, best specimen* :—No award.	
Class No. 77.—*Amaryllis and Lilies* :—No award.	
Class No. 78.—*Asters* :—No award.	
Class No. 79.—*Balsams* :—No award.	
Class No. 80.—*Cannas* :—No award.	
Class No. 81.—*Cannas, best specimen* :—No award.	
Class No. 82.—*Cock's-comb* :—No award.	
Class No. 83.—*Chrysanthemums* :—No award.	
Class No. 84.—*Dahlias* :—No award.	
Class No. 85.—*Dianthus* :—No award.	
Class No. 86.—*Eucharies* :—No award.	
Class No. 87.—*Gloxinias* :—No award.	
Class No. 88.—*Phlox* :—No award.	
Class No. 89.—*Petunias* :—No award.	
Class No. 90.—*Roses* :—	
1st Prize to Mr. Hughes, Perak	5 00
Class No. 91.—*Zinnias* :—No award.	
Class No. 92.—*Best plant in flower* :—No award.	
Class No. 93.—*Begonias* :—No award.	
Class No. 94.—*Group of plants* :—No award.	
Class No. 95.—*Group of Chinese plants* :—	
1st Prize to Chung Yee Sing, Perak	5 00
Class No. 96.—*Asters* (cut flowers) :—No award.	
Class No. 97.—*Chrysanthemums* (cut flowers) :—No award.	
Class No. 98.—*Dahlias* (cut flowers) :—No award.	
Class No. 99.—*Roses* (cut flowers) :—No award.	
Class No. 100.—*Cannas* (cut flowers) :—No award.	
Class No. 101.—*Orchids* (cut flowers) :—No award.	
Class No. 102.—*Cut flowers, arranged* :—	
1st Prize to Mat Tahir, Perak	3 00

SECTION II.

FRUITS.

	Amount. $ c.
Class No. 103.—*Bananas, best collection* :—	
1st Prize to Che Some, Perak	10 00
2nd „ to Serajadin Penghulu, Perak	5 00

SECTION II.—*Continued.*

	Amount. $	c
CLASS No. 104.—*Bananas, best bunch* :—		
1st Prize to Sidang Mat Jin bin Ali, Malacca	3	00
2nd ,, to Soh Lebai Hamat, Penang	2	00
CLASS No. 105.—*Champedak* :—		
1st Prize to Sedang Leman, Malacca	2	00
2nd ,, to Menti Tengat bin Sedih, Malacca	1	00
CLASS No. 106.—*Chiku* :—		
1st Prize to Hadji Salleh, Penang	3	00
2nd ,, to Mat Hasim, Penang	2	00
CLASS No. 107.—*Custard Apple* :—		
1st Prize to Edwin Philips, Perak	2	00
CLASS No. 108.—*Cultivated Fruits* :—		
1st Prize to Tan Lo Heong, Perak ... ... A Cup.		
2nd ,, to Kamuning Estate, Perak	3	00
CLASS No. 109.—*Durian* :—		
1st Prize to Sidang Ali bin Tahir, Malacca	5	00
2nd ,, to Mohamud bin Kassim, Perak	2	00
Highly Commended, Penghulu Indut, Perak		
CLASS No. 110.—*Durian blanda* :—		
1st Prize to Mat bin Hadji Mohamud Saman, Penang	2	00
CLASS No. 111.—*Duku* :—No award.		
CLASS No. 112.—*Binjai* :—		
1st Prize to Sidang Hadji bin Mohamud Musa, Malacca	2	00
2nd ,, to Hadji Mohamud Saman, Penang	1	00
CLASS No. 113.—*Jack fruit* :—		
Penghulu Hassan Machang Bali, Province Wellesley	2	00
CLASS No. 114.—*Jambu* :—		
1st Prize to Kung Thean Sing, Penang	2	00
CLASS No. 115.—*Langsat* :—		
1st Prize to Mohamud Ali, Perak	2	00
2nd ,, to Kulop Ibrahim, Perak	1	00
Highly Commended, Kulop Abdul Rahman, Perak		
CLASS No. 116.—*Limes* :—		
1st Prize to Ibrahim, Penang	4	00
2nd ,, to Kamuning Estate, Perak	2	00
Highly Commended, Penghulu Wahab, Perak		
CLASS No. 117.—*Mangoes* :—No award		
CLASS No. 118.—*Machang* :—No award.		
CLASS No. 119.—*Mangosteens* :—		
1st Prize to Hadji Osman bin Hadji Jalil, Penang	5	00
2nd ,, to Hadji Mohamud Saman, Penang	3	00
Extra K. Hamad, Penang	2	00
CLASS No. 120.—*Mata Kuchéng* :—		
1st Prize to Mata-mata Sahat, Malacca	2	00
CLASS No. 121.—*Melon, any kind* :—		
1st Prize to Mohamud Daud, Perak	3	00
CLASS No. 122.—*Papaya* :—		
1st Prize to Abu Omar, Perak	3	00

SECTION II.—*Concluded.*

	Amount. $	c.
CLASS No. 123.—*Oranges*:—		
1st Prize to Kamuning Estate, Perak	3	00
2nd „ to Luie	2	00
CLASS No. 124.—*Pine-apple*:—Mauritius.		
1st Prize to Penghulu Hassan, Province Wellesley	3	00
CLASS No. 125.—*Pine-apple, any other variety*:—		
1st Prize to Kamuning Estate, Perak	3	00
2nd „ to Raja Hadji Jahaya, Penang	3	00
CLASS No. 126.—*Pomeloes*:—		
1st Prize to (No. 423?)	3	00
2nd „ to Kashi Ahmat Kellmah, Perak	1	00
CLASS No. 127.—*Pulasan*:—		
1st Prize to Hadji Omar, Negri Sembilan	2	00
2nd „ Ibrahim, Penang	1	00
CLASS No. 128.—*Rambai*:—		
1st Prize to Bahab bin Syed, Selangor	2	00
2nd „ to Mohamud Daud, Perak	1	00
CLASS No. 129.—*Rambutan*:—		
1st Prize to Bahari, Province Wellesley	2	00
2nd „ to Mat bin Hadji Mohamud Saman, Penang	1	00
CLASS No. 130.—*Wild edible fruits*:—		
1st Prize to (No. 554 A?)	5	00
CLASS No. 131.—*Any kind of fruits not included above*:—		
1st Prize to Law Chit Mun, Penang	3	00
2nd „ to Mohamud Sah Penghulu, Selangor	2	00
Highly Commended, Kamuning Estate, Perak		...

SECTION III.

VEGETABLES.

	Amount. $	c.
CLASS No. 132.—*Preserved fruits*:—		
1st Prize to E. E. Lessler, Perak	8	00
2nd „ to Francis Alexander, Selangor	4	00
CLASS No. 133.—*Chutney*:—		
1st Prize to Francis Alexander, Selangor	5	00
CLASS No. 134.—*Pickles*:—		
1st Prize to Francis Alexander, Selangor	5	00
CLASS No. 135.—*Jellies*:—		
1st Prize to E. E. Lessler, Perak	5	00
2nd Prize to Francis Alexander, Selangor	2	00
CLASS No. 136.—*Artichokes*:—		
1st Prize to A. B. Stephens, Perak	2	00
CLASS No. 137.—*Benny fruits*:—		
1st Prize to Nykong, Penang	2	00
CLASS No. 138.—*Brinjals*:—		
1st Prize to Mat Jawi Penghulu, Perak	2	00
2nd „ to Sidang Arshad bin Osman, Malacca	1	00

SECTION III.—*Continued.*

		Amount. $	c.
CLASS No. 139.—*Beans* :—			
1st Prize to Belal Mohamud Daud, Perak	...	3	00
2nd „ to Ali, Penang	...	2	00
CLASS No. 140.—*Cabbage* :—No award.			
CLASS No. 141.—*Chillies* :—			
1st Prize to Ngah Ahmat, Perak	...	3	00
2nd „ to Pandak Jenal, Perak	...	2	00
CLASS No. 142.—*Cucumbers* :—			
1st Prize to Penghulu Hassan, Province Wellesley	...	2	00
CLASS No. 143.—*Herbs used in curry* :—No award.			
CLASS No. 144.—*Ladies fingers* :—			
1st Prize to Nyah Amin, Perak	...	2	00
CLASS No. 145.—*Lettuces* :—			
1st Prize to Ahmad, Penang	...	2	00
CLASS No. 146.—*Onions* :—			
1st Prize to Kung Sin Woe, Penang	...	2	00
CLASS No. 147.—*Pumpkins* :—			
1st Prize to Kamuning Estate, Perak	...	2	00
CLASS No. 148.—*Radishes* :—			
1st Prize to Kung Sin Woe, Penang	...	2	00
CLASS No. 149.—*Tomatoes* :—No award.			
CLASS No. 150.—*Vegetables and Herbs for making salad* :—			
1st Prize to G. S. Hussain, Penang	...	4	00
CLASS No. 151.—*Water Melons* :—			
Penghulu Hadji Osman, Perak	...	5	00
CLASS No. 152.—*Yams, etc.* :—			
1st Prize to Alang Abdul Rahman, Perak	...	4	00
2nd „ to Abdul Aziz, Perak	...	2	00
CLASS No. 153.—*Any vegetable not in above* :—			
1st Prize to Kulop Mat Ali, Perak	...	2	00

DIVISION *C.*

Cattle and Poultry.

			Amount. $	c.
CLASS No. 154.—*Bull, locally bred* ...	Bruseh Hyd. M. Co.	1st Prize	20	00
CLASS No. 155.—*Cow, do.* ...	Ramasamy, K. K. ...	„	20	00
CLASS No. 157.—*Pair Indian Bullocks* ...	M. Vallipuram, K. K.	„	20	00
CLASS No. 160.—*Cow & Calf, locally bred*	Ramasamy, K. K. ...	„	10	00
CLASS No. 161.—*Buffaloe bull* ...	Pendika Said ..	„	10	00
CLASS No. 163.—*Buffaloe Cow, locally bred*	Abdul Raman ...	„	10	00
CLASS No. 164.—*Champion animal* ...	Bruseh Hyd. M. Co.	„	20	00
CLASS No. 165.—*Ram goat* ...	Hadji Ali Saiong ...	„	5	00
CLASS No. 166.—*Goat with Kids* ...	Raja Hamza ...	„	5	00
CLASS No. 168.—*Sheep ram* ...	Uda Mohamud Ali ...	„	5	00
CLASS No. 169.—*Do. Ewe* ...	Edwin Phillips ...	„	5	00
CLASS No. 170.—*Bantam Cock and Hen* ..	Sidang Hadji Madali	„	5	00

DIVISION *C.—Continued*

				Amount. $	c.
CLASS No. 171.—*Malay Cock and Hen* ...	W. W. Douglas	...	,,	5	00
CLASS No. 173.—*Collection, Malay fowls*...	Anjang Aris	...	,,	5	00
CLASS No. 174.— *Do. Chinese fowls*...	Pandak Kemal, K. K.		,,	5	00
CLASS No. 175.— *Do. any breed* ...	A. D. Machado	...	,,	5	00
CLASS No. 176.—*Manila Drakes & 2 Ducks*	B. O. Stoney	..	,,	5	00
CLASS No. 177.—*Javanese ,, ,,* ...		...	,,	5	00
CLASS No. 178.—*Gander and Goose* ...	Hadji Jabar	...	,,	5	00
CLASS No. 180.—*Guinea fowls, Cock & Hen*	Ngah Abass	...	,,	5	00
CLASS No. 181.—*Pigeons, any breed* ...	C. G. Simons	...	,,	5	00
CLASS No. 182.—*Best cage bird* ...	Tunku Sleiman	...	,,	5	00
CLASS No. 183.—*Collection, cage birds* ...	Vangoo (Balik Pulau)		,,	5	00
CLASS No. 184.—*Rabbits, Buck & Doe* ...	A. D. Machado	...	,,	5	00
CALSS No. 185.—*Champion Cat in Show*...	Pandak Kamal	...	,,	5	00
CLASS No. 186.—*Best Butter* ...	J. S. Hussain	...	,,	5	00
CLASS No. 187.—*Collection of Eggs* ...	A. D. Machado	...	,,	5	00
CLASS No. 188.— *Do. do. Ducks*...	Kang Thean Sung	...	,,	5	00
CLASS No. 190.—*Best Fox Terrier* ...	W. W. Douglas	...	,,	10	00
CLASS No. 192.— *Do. Retriever* ...	,,	...	,,	10	00
CLASS No. 193.— *Do. Hunting dog* ...	,,	...	,,	10	00
CLASS No. 194.—*Champion dog* ...	,,	...	,,	10	00

EXTRA PRIZES.

CLASS No. 154.—*Bull* ...	Mr. Machado	...	2nd Prize	10	00
CLASS No. 168.—*Sheep ram* ...	Sagomader (Taiping)		,,	3	00

DIVISION *D.*

Malay Arts and Industries.

CLASS No. 196.—*Silver Works, best specimen* :—No award.

CLASS No. 197.—*Silver Works, best collection* :—

2nd Prize to District Officer, Kinta, Perak	5	00

CLASS No. 198.—*Tinware* :—

1st Prize to Ngu Seng, Seremban	10	00
2nd ,, to Tai Shin, Seremban	5	00

CLASS No. 199.—*Kris* :—

1st Prize to Penghulu Indut, Perak	7	00
2nd ,, to Mohamud Ali, Perak	3	00

CLASS No. 200.—*Carved or Ornamental Walking Stick* :—

1st Prize to Hamad, Perak	5	00

CLASS No. 201.—*Unadorned Walking Stick* :—

2nd Prize to Ngah Ahmat, Perak	2	00

CLASS No. 202.—*Malay Wood-carving* :—

1st Prize to Raja Ali, Selangor	10	00
2nd ,, to Hadji Abdullah bin Mohamud Ahmad, Penang ...	5	00

CLASS No. 203.—*Malay Embroidery* :—

Penghulu, Batu Gajah, Perak	15	00

CLASS No. 204.—*Malay Lace* :—

1st Prize to Penghulu Baba bin Taib, Malacca	7	00
2nd ,, to Sidang Arshad bin Osman, Malacca	3	00

	Amount.	
	$	c.
Class No. 205.—*Sarong, silk and gold*:—		
1st Prize to Penghulu, Papan, Perak	10	00
2nd „ to Penghulu, Ipoh, Perak	5	00
Class No. 206—*Sarong, silk*:—		
1st Prize to Tunku Puan Besar, Pahang	10	00
2nd „ to Inche Ngah bin Hadji Abdul Rahman, Pahang ...	5	00
Class No. 207.—*Saro g, cotton*:—		
1st Prize to Slaiman, Perak	7	00
2nd „ to Mohamud bin Hadji Jumol, Penang	3	00
Class No. 208.—*Kain Lepas*:—		
1st Prize to Hadji Mohamud Ali, Penghulu, Perak	5	00
Class No. 209.—*Selendang*:—		
2nd Prize to Sulaiman, Perak	2	00
Class No. 210.—*Kain Telepok*:—		
1st Prize to Penghulu Jugra and Banda, Selangor	7	00
Class No. 211.—*Ornamental baskets, rattan*:—		
1st Prize to E. E. Lessler, Perak	7	00
Class No. 212.—*Ornamental baskets, pandan*:—		
1st Prize to Sidang Hadji Mat Ali, Malacca	7	00
2nd „ to Tijah, Malacca	3	00
Class No. 213.—*Hats, pandan*:—		
1st Prize to Collector of Land Revenue, Seremban?	7	00
2nd „ to Collector of Land Revenue, Seremban?	3	00
Class No. 214.—*Hats, terendak*:—		
1st Prize to Saib bin Ain, Penang	5	00
2nd „ to Mohamud bin Kassim, Perak	2	00
Class No. 215.—*Mats, embroidered*:—		
1st Prize to Hadji Mat Awin, Perak	10	00
2nd „ to Raja Abdul Mali, Perak	5	00
Class No. 216.—*Mats, coloured*:—		
1st Prize to Che Pandak Abdullah, Perak	5	00
2nd „ to H. Berkley, Perak	2	00
Class No. 217.—*Mats (tikar bangka)*:—		
1st Prize to Mohamud Arsad, Perak	5	00
2nd „ to V. V. Peters, Perak	2	00
Class No. 218.—*Mats (tikar hampar)*:—		
1st Prize to Mohamud Mansoor, Perak	5	00
2nd „ to Datoh Paduka Rajah, Perak	2	00
Class No. 219.—*Mats, pand n*:—		
1st Prize to Mohamud Osman bin Mohamud Taib, Penang ...	5	00
2nd „ to Nyah Abas, Perak	2	00
Class No. 220.—*Mats, rattan*:—		
1st Prize to Che Pandak Abdullah, Perak	5	00
2nd „ to Mohamud Noor, Perak	2	00
Class No. 221.—*Models of Riverine Fish-traps*:—		
1st Prize to Mohamud Mansoor	10	00
Class No. 222.—*Models, Traps and Snares for Game*:—		
1st Prize to Mohamud Mansoor, Perak	10	00
2nd „ to Ismail, Perak	5	00
Class No. 223.—*Sakai and Semang Articles*:—		
1st Prize to Penghulu Batang Padang, Perak	7	00
2nd „ Panjang Abu Baker, Perak	2	00

DIVISION *D.—Concluded.*

	Amount. $	c.
CLASS No. 224.—*Articles made from Coconut Palm* :—		
1st Prize to Che Omar, Selangor	10	00
2nd „ to Hadji Sirat K. S. Hadji Mohamud, Perak	5	00
CLASS No. 225.—*Sireh Requisites, Metal* :—		
1st Prize to Hadji Osman, Penang	7	00
2nd „ to Hadji Mohamud Sahis, Penang	3	00
CLASS No. 226.—*Sireh Requisites, in Woven-work* :—		
1st Prize to Kulop Abdul Rahman, Perak	7	00
CLASS No. 227.—*Chicks* :—		
1st Prize to H. Berkley, Perak	5	00
2nd „ to Anjang Idris, Perak	2	00
CLASS No. 228.—*Kajang, pandan (Mengkuang)* :—		
1st Prize to Datoh Paduka Rajah	5	00
2nd „ to Penghulu Mohamud Noordin, Perak	2	00
CLASS No. 229.—*Kajangs, nipah* :—		
1st Prize to Abdul Ali, Perak	5	00
2nd „ to Alang Mohamud Talip, Perak	2	00
CLASS No. 230.—*Ataps* :—		
1st Prize to Abdul Ali, Perak	7	00
CLASS No. 231.—*Rope and Twine* :—		
1st Prize to Sidang Hadji Mat Ali, Perak	10	00
2nd „ to Syed Ahmad, Penang	5	00
CLASS No. 232.—*Bird's Cage* :—		
1st Prize to Ngah Ahmat, Perak	5	00
2nd „ to Hadji Salib, Penang	2	00
CLASS No. 233.—*Strainer (tapisan)* :—		
1st Prize to S. Ahmad, Selangor	5	00
2nd „ to Omar, Perak	2	00
CLASS No. 234.—*Niru* :—		
1st Prize to Haron bin Abdul Rahaman, Penang	5	00
2nd „ to Hadji Mohamud Yasin, Perak	2	00
CLASS No. 235.—*Parang (with handle)* :—No award.		
CLASS No. 236.—*Golok (with sheath)* :—		
2nd Prize to Penghulu Ali, Malacca	2	00
CLASS No. 237.—*Flower Pots* :—		
1st Prize to Meena Mariuppen, Province Wellesley	7	00
2nd „ to Wan Kichil, Perak	3	00
CLASS No. 238.—*Cooking Pots* :—		
1st Prize to Wan Kichil, Perak, ...	7	00
2nd „ to Do.	3	00
CLASS No. 239.—*Water-vessels* :—		
1st Prize to District Officer, Kuala Kangsar, Perak	10	00
2nd „ to Datoh Paduka Rajah, Perak	5	00
CLASS No. 240.—*Roofing Tiles* :		
1st Prize to Tan Ong Peng, Perak	10	00
2nd „ to Penghulu Indut, Perak	5	00
CLASS No. 241.—*Flooring Tiles* :—		
1st Prize to Mohamud, Penang	10	00
2nd „ to Penghulu Indut, Perak	5	00
CLASS No. 242.—*Bricks* :—		
1st Prize to Tan Ong Peng, Perak	10	00
2nd „ to Seng Hin, Perak	5	00

Division *E*.

Agricultural Implements.

Class No. 253.—*Padi Implements* :—

1st Prize to Anjang Mohamud Daud, Kuala Kangsar.
2nd „ to Haji Mat Jassin bin Haji Ali, Bagan Serei.
3rd „ Not awarded.

Class No. 254.—*Agricultural Implements other than for Padi or Rubber locally made* :—

1st Prize to Penghulu Usop bin Haji Kechil, Malacca.
2nd Mohamed Kassim, Penang.

Class No. 255.—*Agricultural Implements, European made* :—

1st Prize to C. R. Salisbury, Gapis Estate, Perak.

Class No. 256.—*Rubber Machinery in motion* :—

1st Prize to Federated Engineering Company, Kuala Lumpur.—(Cup).

Class No. 257.—No entries.

Class No. 258.—*Bullock Cart* :—

1st Prize to M. Vallipuram, Kuala Kangsar.
2nd „ to T. Hasman, Kuala Kangsar.

Class No. 260.—*Agricultural Baskets* :—

1st Prize to Syed Ahmat, Penang.
2nd „ to Jaudin bin Abu, Pengkalan Rama, Malacca.

Class No. 262.—*Miscellaneous* :—

Special Prize to Penghulu Che Puteh, Krian.

LIST OF MEDALS.

No.	Names.	Place.	Exhibits.	Number of Medals.
I	Mr. A. C. Hardowin	Bukit Tamboon	Lemon Grass Oil ...	I Medal.
2	Bruseh Hydraulic Tin Mining Co.	Bidor ...	Cattle ...	2 Medals.
3	Mr. E. B. Prior ...	...	Coffee ...	I Meda .
4	Mr. A. D. Machado	Sungai Siput.	Medicinal Plants, Fibre and Essential Oils ...	3 Medals.
5	Singapore Oil Mills	Singapore ...	Cocoanut Oil	I Medal.
6	Caledonia Estate	P. Wellesley...	Sugar Canes	I ,,
7	Mr. Tan Oon Peng	K. Kangsa ...	Roofing Tiles	I ,,
8	Mr. Tan Oon Peng	K. Kangsa ...	Bricks ...	I ,,

LIST OF DIPLOMAS.

No.	Names.	Place.	Exhibits.	Number of Diplomas.
I	Mr. H. B. Collinge	538, 252 and Teluk Anson Girls' School	Embroidery	2 Diplomas.
2	Mr. A. D. Machado	Sungai Siput	Fibre ...	I Diploma.
3		Kuala Kangsar	Padi & Pulut	I ,,
4	Fed. Eng. Coy. Ltd.	Kuala Lumpur	Rubber Machinery	I ,,
5	Highlands & Low-lands ...	Selangor ...	Rubber ...	I ,,
6	Mr. A. B. Stephens	Taiping ...	Tin Roofing	I ,,
7	Tungku Tuan Besar	Pahang ...	Silk Sarongs	I ,,
8	Brunei Exhibit ...	...	...	...

AGRICULTURAL SHOW 1907.

BALANCE SHEET.

RECEIPTS.

	$	c.
By Government Contributions, S. S.	2,000	00
By Government Contributions, F. M. S.	2,000	00
By Public Subscriptions	2,695	00
By sale of sheds, materials etc.	718	75
Total ...	$7,413	75

PAYMENTS.

Cost of Buildings	3,300	00
Cost of Prizes	2,010	00
Printing, $196; Compensation, $427.20; Wages, $75; Accommodation, $225.66; Rent, $130; Advertisements, $76.67; Transport, $123.68; Sundries, $111.58; Telegrams and Postage $25.38; ...	1,391	17
Balance handed to Secretary to Resident, Perak ...	712	58
Total ...	$7,413	75

GOW, WILSON & STANTON, LIMITED—
India Rubber Market Report.

13, ROOD LANE, LONDON, E.C.
August 9th, 1907.

At to-day's auction, about 843 packages of Ceylon and Malaya Plantation grown rubber were under offer, of which, about 427 were sold.

The auction having been postponed until after the holidays, offerings were rather larger than usual, the total weight amounting to 45 tons, Ceylon contributing over 10, and Malaya about 35 tons.

Competition was in most instances somewhat irregular, and a decline of about 1*d*. to 2*d*. per lb. was recorded for the finer grades, except in the case of a few lots shewing particularly attractive quality which were well competed for, and sold up to 5/10 per lb.—this price being realized for some Ceara biscuits from Rangbodde Estate.

There were a few parcels of finer crepe than has recently been offered at auction, and 5/8 was paid for one lot of very even pale colour.

Most of the unwashed scrap found buyers at prices shewing little change on last rates.

TO-DAY'S QUOTATIONS.

SHEET, ETC.

Fine Amber Sheet	$5/3\frac{1}{2}$ to $5/4\frac{1}{4}$
Dull Sheet	$5/2\frac{3}{4}$ to 5/3
Ceara Biscuits	5/- to 5/10
Fine Palish Biscuits	5/6
Fine Biscuits	$5/3\frac{1}{2}$ to $5/4\frac{3}{4}$

CREPE.

Fine Pale	5/4 to 5/8
Palish to darkish	$4/8\frac{1}{4}$ to 5/1
Dark	3/6 to $4/6\frac{1}{4}$
Darkish and Dark Block	$3/8\frac{1}{2}$ to $4/9\frac{1}{2}$
Rambong Block	4/-

UNWASHED SCRAP.

Fine	4/1 to 4/3
Fair to medium	3/9 to $3/10\frac{1}{2}$

PLANTATION AVERAGE, AND COMPARATIVE PRICES

AVERAGE PRICE OF CEYLON AND MALAYA PLANTATION RUBBER.

To-day	427 pkgs.	$4/10\frac{3}{4}$
Corresponding sale last year ...	161 pkgs.	5/6

Plantation.		Hard Fine Para.
Fine.	Scrap.	
5/3 to 5/10	3/9 to 4/3	$4/9\frac{1}{2}$
5/8 to $5/9\frac{1}{4}$	4/- to 4/8	5/2

Particulars and prices as follows :—

Ceylon.

Mark.	Pkgs.	Description.		Price.
Arapollakande	12	Fine biscuits	...	bought in.
	1	Good ,,	...	bought in.
	4	Darkish and dark block	...	bought in.
Glencorse	2	Rough biscuits	...	bought in.
	4	Scrap and rejections	...	3/9½.
Culloden	10	Pressed crepe	...	4/6 to 4/6¼.
	1	Darker ,,	...	3/11.
Heatherley	13	Pressed crepe	...	4/5½.
	2	Black ,,	...	bought in.
	4	Dark ,,	...	4/5½.
	2	Black ,,	...	bought in.
K M	5	Scrap and rejections	...	bought in.
	2	Dark scrap	...	bought in.
Hattangalla	2	Good biscuits	...	5/4¾.
	1	Pressed crepe	...	4/5¾.
Ellakande	3	Brown pressed crepe	...	4/6¼.
	1	Black ,,	...	bought in.
J J V & Co.	2	Dark block	...	bought in.
	2	Rambong	...	bought in.
	1	Dark pressed crepe	...	bought in.
A	4	Lump scrap	...	bought in.
Ambatenne	2	Good biscuits	...	5/3¾.
	1	Good scrap	...	4/2¼.
Sorana	4	Good biscuits	...	5/3¾ to 5/4.
Waharaka	2	Scrap	...	4/1.
Gonakelle	2	Very fine biscuits	...	5/6.
	1	Good scrap	...	4/1½.
	1	Lump ,,	...	4/1½.
Rangbodde	2	Very fine pale Ceara biscuits		5/10.
	1	Fine scrap	...	4/1½.
Tallagalla	2	Good biscuits	...	5/4.
	2	Good and medium scrap	...	4/1.
	1	Earthy scrap	...	3/10.
	1	Rejections	...	3/10.
Taldua	2	Good biscuits	...	5/4.
	1	Fine scrap	...	4/1.
Palli	9	Good Ceara biscuits	...	5/-.
Densworth	2	Good biscuits	...	5/3¾.
	2	Good and medium scrap part sold	...	4/1.
K M	1	Good block	...	bought in.

Mark.	Pkgs.	Description.	Price.
Poonagalla	1	Very fine pale biscuits ...	5/8½.
	1	Rough biscuits and scrap ...	bought in.
Glanrhos	6	Biscuits ...	5/3½ to 5/3¾.
	4	Crepe ...	4/4½.
Clontarf	1	Good biscuits ...	5/3½.
	1	Crepe ...	4/4¾.
	1	Darker ...	bought in.
Veralupitiya	1	Good sheet ...	5/3¾.
	1	Good scrap ...	4/0¾.
Mipitiakande	1	Biscuits and scrap ...	3/6.
Tudugalla	7	Pale block ...	5/- bid.
	2	Dark ...	bought in.
Kipitiagalla	41	Fine sheet ...	5/3¾.
	1	Rough biscuits ...	bought in.
	2	Cuttings ...	3/10¼.
	2	Scrap ...	3/9½.
	2	Wet block ...	bought in.
Suduganga	3	Rough sheet ...	bought in.

MALAYA.

Mark.	Pkgs.	Description.	Price.
P S E	8	Fine sheet ...	5/4.
	2	Dark block ...	3/9¾.
L S H	3	Good to fine sheet ...	5/4 to 5/4¼.
	1	Fine scrap ...	4/1½.
	3	Scrap and rejections ...	3/9.
K	6	Crepe ...	4/4½ to 4/11.
V R Co Ld. Klang FMS	30	Good crepe ...	4/11¾ to 5/-.
	6	Palish block ...	4/8½.
	10	Dark smoked block ...	bought in.
	3	Darkish block ...	bought in.
K P & Co. Ld. Highlands	8	Dark smoked block ...	bought in.
	14	Good sheet ...	5/3½ to 5/4¼.
	10	Dark block part sold,	4/9¼.
	2	Rambong block ...	bought in.
	30	Good sheet ...	5/3½ to 5/4¼.
	4	Fine palish crepe ...	4/9¾.
	15	Darkish to dark crepe ...	4/3 to 4/6¼.
	2	Rambong block ...	4/-.
	10	Darkish to dark block part sold,	4/9¼.
B & D	7	Fine sheet ...	5/3½.
	3	Rejections ...	3/11 to 4/-
	4	Good and medium crepe ...	3/6 to 4/10¼.
	1	Crepe ...	4/-.
F K K P	2	Fine sheet ...	5/3½.
	1	Wound ball scrap ...	3/6.
	1	Rejections ...	3/8.

Mark.	Pkgs.	Description.		Price.
B M & Co.	12	Sheet	...	bought in.
	6	Dark heated crepe	...	bought in.
L C K	2	Fine sheet	...	bought in.
McI	1	Rejections	...	3/10½.
	1	Dark scrap	...	3 10½.
	4	Sheet	...	5/3½.
	1	Earthy scrap	...	3/10½.
S & D	7	Good to fine sheet	...	5/3½.
	2	Rejections	...	bought in.
	2	Dark scrap	...	bought in.
S P S	1	Rejections	...	bought in.
	1	Scrap	...	bought in.
S P	1	Scrap	...	bought in.
	2	Biscuits	...	bought in.
	1	Sheet	...	bought in.
	2	Rambong	...	bought in.
Damansara	5	Darkish block	...	4/6.
	1	Dark ,,	...	4/-.
H	10	Rambong	...	bought in.
C M R E Ltd.	46	Good and medium crepe		part sold, 4/8.
Shelford	2	Fine sheet	...	bought in.
Linggi	39	Very fine crepe		part sold, 5/8.
	9	Good crepe	...	4/5½.
	8	Dark pressed crepe	...	bought in.
	1	Palish blocked crepe	...	4/6.
Bila	32	Good to very fine sheet		part sold, 5/4.
	4	Good to fine scrap	...	4/2½ to 4/2¾.
	5	Fine scrap	...	4/2¾.
	2	Dark sheet	...	bought in.
	8	Good scrap	...	4/2¾ to 4/3.
	6	Rejections	...	3/11¾.
	5	Dark scrap	...	4/2½.
Jebong	23	Very fine pale pressed crepe		withdrawn.
	10	Fine pressed crepe	...	bought in.
	11	Darkish crepe	...	bought in.
S S B R Co. Ld.	6	Fine sheet	...	5/4.
	3	Crepe	...	bought in.
	2	Dark pressed crepe	...	bought in.
K M A, Etc. B	10	Fine pale blocked crepe	...	bought in.
	1	Darker	...	4/9.
	2	Greyish	...	4/2¼.
	4	Darkish & dark blocked crepe		3/9.
B N S	13	Dark sheet	...	5/2¾ to 5/3.
	9	Dark pressed crepe	...	5/3¾.

Mark.	Pkgs.	Description.	Price.
LABU M Etc.	1	Fine sheet ...	5/3¾.
	5	Darker ...	5/3¾.
	10	Good crepe ...	4/9 to 5/4.
	9	Darker ...	bought in.
	3	Crepe ...	4/1 to 4/5.
	3	Sheet and biscuits ...	5/3¾.
Batu Tiga	4	Good biscuits ...	5/3¼ to 5/4.
	3	Crepe ...	bought in.
	1	Dark rolled crepe ...	bought in.
Pataling	15	Crepe ...	bought in.
NR	1	Rejections ...	bought in.
A M R C	6	Good and medium crepe	part sold, 4/10¼.
F (S) R Co. Ld.	10	Good sheet ...	bought in.
B R R Co. Ld.	10	Fine block ...	bought in.
	12	Darker ...	bought in.
	35	Sheet	part sold, 5/3½ to 5/3¾.
	19	Good dark block ...	bought in.

TEA, COFFEE & RUBBER SHARES.

MONDAY, SEPTEMBER 2ND, 1907.

INDIAN.	Current Price.	Dividend for 1905.	Dividend for 1906.	Yield per cent on last full Year's Div.
AMALGAMATED (£10), fully paid, Ord.	$2\frac{3}{4}$–$3\frac{1}{4}$	nil	nil	—
" 5% Cum. Pref. (£10)	8–$8\frac{1}{2}$	(*a*) 3	5	$5\frac{1}{2}$
ANGLO-AMERICAN DIRECT TEA TRADING CO., LTD., Ord. (£10)	$5\frac{1}{2}$–6	2	$2\frac{1}{2}$	5
ANGLO-AMERICAN DIRECT TEA TRADING CO., LTD., 6% Cum. Pref. (£10)	$8\frac{1}{2}$–9	6	6	$6\frac{1}{2}$
ASSAM CO. (£20)	29–31	$8\frac{1}{2}$	$8\frac{1}{2}$	$5\frac{1}{8}$
ASSAM FRONTIER Ord. (£10)	8–9	6	6	$6\frac{1}{4}$
" 6% Cum. Pref. (£10) ...	$9\frac{3}{4}$–$10\frac{1}{4}$	6	6	$5\frac{7}{8}$
ATTAREE KHAT (£5)	6–$6\frac{1}{2}$	8	10	7
BAROOARA Ord. (£10)	9–$9\frac{1}{2}$	4	5	4
" 5% Cum. Pref. (£10)	8–$8\frac{1}{2}$	5	5	$6\frac{2}{3}$
" 5% Deb. (£100)	95–100	5	5	5
BENGAL UNITED Ord. (£10)	11–$11\frac{1}{2}$	$7\frac{1}{2}$	$7\frac{1}{2}$	$6\frac{3}{4}$
" 5% Cum. Pref. (£10)	$8\frac{3}{4}$–$9\frac{1}{4}$	5	5	$5\frac{1}{2}$
BRAHMAPOOTRA (£5)	$9\frac{1}{2}$–10	10	14	6
BRITISH INDIAN Ord. (£5)	$3\frac{3}{4}$–$4\frac{1}{4}$	nil	4	$5\frac{1}{2}$
" 5% Cum. Pref. (£5)	$4\frac{1}{2}$–$5\frac{1}{2}$	5	5	$4\frac{13}{16}$
CACHAR & DOOARS Ord. (£10)	$8\frac{1}{2}$–9	nil	4	6
" 6% Cum. Pref. (£10) ...	9–$9\frac{1}{2}$	6	6	$5\frac{1}{2}$
CHARGOLA Ord. (£1)	25/–26/	7	10	$5\frac{1}{2}$
" 7% Cum. Pref. (£1)	$1\frac{1}{8}$–$1\frac{1}{4}$	7	7	$5\frac{5}{8}$
CHUBWA Ord. (£5)	$7\frac{3}{4}$–$8\frac{1}{4}$	10	15	9
" 7% Cum. Pref. (£5)	$6\frac{1}{4}$–$6\frac{1}{2}$	7	7	6
CONSOLIDATED Ord. (£10), £10 paid	$4\frac{1}{4}$–$4\frac{1}{2}$	—	—	—
" 5% Cum. 1st Pref. (£10)	$8\frac{1}{2}$–9	(*a*) 7	$10\frac{1}{2}$	$7\frac{1}{3}$
" 7% Cum. 2nd Pref. (£10) ...	12–$12\frac{1}{2}$	—	nil	—
" $4\frac{1}{2}$% Deb.	93–96	$4\frac{1}{2}$	$4\frac{1}{2}$	5
DARJEELING (£20)	13–14	$4\frac{1}{2}$	—	5
DARJEELING Con. Ord. (£10)	$4\frac{1}{4}$–$4\frac{1}{2}$	—	nil	—
" 5% Cum. Pref. (£10)	$8\frac{1}{2}$–9	5	5	6
DOOARS Ord. (£10)	$18\frac{1}{2}$–$19\frac{1}{2}$	$12\frac{1}{2}$	20	9
" 7% Cum. Pref. (£10)	$13\frac{1}{2}$–$14\frac{1}{2}$	7	7	5
DOOM DOOMA (£10)	16–$16\frac{1}{2}$	10	10	$5\frac{3}{4}$
EASTERN ASSAM (£5)	7–$7\frac{1}{2}$	6	10	$6\frac{1}{4}$
EMPIRE OF INDIA Ord. (£10)	$9\frac{3}{4}$–$10\frac{1}{4}$	5	10	$9\frac{1}{2}$
" 5% Cum. Pref. (£10)	$8\frac{3}{4}$–9	5	5	$5\frac{1}{2}$
IMPERIAL TEA Ord. (£10)	$7\frac{1}{4}$–$7\frac{1}{2}$	4	6	$7\frac{1}{2}$
" 5% Cum. Pref. (£10)	$8\frac{3}{4}$–$9\frac{1}{4}$	5	5	$5\frac{1}{2}$
JOKAI Ord. (£10)	12–$12\frac{1}{2}$	7	8	5
" 6% Cum. Pref. (£10)	12–$12\frac{1}{2}$	6	6	$4\frac{3}{4}$
JOREHAUT (£1)	40/–41/	10	$12\frac{1}{2}$	6
KANAN DEVAN Ord. (£10, fully paid)	5–6	nil	2	4
" 6% Cum. Pref. (£10)	8–9	6	6	$6\frac{2}{3}$
LEBONG (£8)	10–$10\frac{1}{2}$	10	10	$6\frac{3}{8}$
LUNGLA, Ord. (£10)	$7\frac{1}{2}$–$8\frac{1}{2}$	3	—	4
" 6% Cum. Pref. (£10)	10–$10\frac{1}{2}$	6	6	$5\frac{3}{4}$
" 5% Deb.	99–101	5	5	5
MAKUM, (10s.)	11/–12/	4	$7\frac{1}{2}$	$6\frac{1}{4}$
" 5% Deb.	93–95	5	5	$5\frac{1}{4}$
MAJULI Ord. (£10)	$7\frac{1}{2}$–8	5	6	[illegible]
" 6% Cum. Pref. (£10)	10–$10\frac{1}{2}$	6	6	$5\frac{3}{4}$
MOABUND Ord. (£1)	21–12	6	10	8

Tea, Coffee & Rubber Shares.—*Continued.*

Indian.—*Continued.*	Current Price.	Dividend for 1905.	Dividend for 1906.	Yield per cent on last full Year's Div.
Moabund 5% Cum. Pref. (£1)	¾–⅞	5	5	6
,, 5% Deb. (£100).	96–100	5	5	5
Nedeem, Ord. (£10)	10–10½	2½	6	2
,, 5% Cum. Pref. (£10)	8½–8¾	5	5	5¾
Sephinjuri Bheel (5s.) new	$\frac{7}{8}$–$\frac{15}{16}$	25	25	7½
Singlo, Ord. (£10)	3–4	—	—	—
,, 6½ non Cum. Pref. (£10)	6–6½	—	—	—
CEYLON.				
Alliance, Ord. (£10)	10¼–10¾	7	7	6½
,, 6% Deb.	100–103	6	6	5¾
Anglo Ceylon, 5% Deb. (£100,000) new ...	98–100	5	5	5
,, Ord. Stock	129–131	6	8	6½
,, Surplus Certificates	80–85	—	—	—
Bandarapola, Ord. (£10) fully paid	20–22	7½	7½	3¾
,, ,, (£10) £5 ,, ...	8½–9½	7½	7½	4½
,, ,, (£10) £5 ,, (new) ...	7½–8	—	7½	4¾
Ceylon Tea Plant, Ord. (£10)	34–35	15	15	4¼
,, 7% Cum. Pref. (£10)	15–16	7	7	4⅜
Ceylon Propy., Ord (£1)	½–⅝	2	nil	—
,, 5% Cum. Pref. (£1)	⅝–⅞	5	5	6
Consolidated Estates, Ord. (£10)	20–21	8	*4	4½
,, ,, Pref. (£10)	12–13	8	*4	6⅛
Dimbula Valley, Ord. (£5)	6–6¼	8	8	6½
,, 6% Cum. Pref. (£5)	5¾–6	6	6	5
Eastern Produce, Ord. (£5)	8⅞–9⅛	6	7½	4¾
,, 5% Cum. Pref. (£5)	5–5½	5	5	$4\frac{13}{16}$
New Dimbula, (£1)	3⅛ 3⅜	24	—	7
Nuwara Eliya, (£10)	10½–11	7	7	6
Panawatte T & Rubber, (£5)	8¾–9¼	—	2	1½
,, ,, (£5) £3 paid ...	1–1½pm	—	2	1½
Standard, (£10) £6 paid	13–13½	15	15	6½
,, (£10) £10 paid	23–25	15	15	6
Yatiyantota, Ord. (£10)	16½–17	5	5	3
,, 6% Cum. Pref. (£10)	10½–11	6	6	5½
COFFEE COMPANIES.				
Dumont, Ord. (£10)	1½–2	—	—	—
,, 7½% Cum. Pref. (£10)	5½–6	(a) 11¼	(a) 11	6
,, 5½% Deb.	95–98	5½	5½	5½
San Paulo, 5½% Deb.	98–100	—	—	5½
RUBBER COMPANIES.				
Anglo-Malay, £140,000 Ord. (£1) 15/- paid ...	4½–4⅝	—	18	3½
,, f.-pd.	5⅜–5½	—	18	3½
Batu Caves, £11,000 Ord. (£1) 17/6 paid ,, £7,000 Ord. (£1) fully paid	3–3½ pm	—	—	—
Bukit Rajah, £66,700 Ord. (£1) fully paid ...	6½–6⅝	6	30	5½
Consolidated Malay, £55,000 (£1) fully paid ...	3⅜–3½	—	10	4
Ceylon Cocoa & Rubber, £15,000 Ord. (£1) ...	1½–2	—	—	—
Cicely Rubber Estates, £6,000 Ord. (£1) ...	5–5¼	5	—	—
,, ,, ,, £4,500 5% Pref. (£1) ...	5¼–5½	10	—	—

Tea, Coffee & Rubber Shares.—*Concluded.*

Rubber Companies.—*Continued.*	Current Price.	Dividend for 1905.	Dividend for 1906.	Yield per cent on last full Year's Div.
Golden Hope, £40,000 Ord. (£1)	$1\frac{7}{8}$–2	—	5	$3\frac{1}{2}$
Highlands Para, £181,454 fully paid	$3\frac{1}{2}$–$3\frac{5}{8}$	—	(*g*) 11	8
,, ,, £123,546 £1,7/6 paid ...	$1\frac{9}{16}$–$1\frac{5}{8}$ pm	—	(*g*) 11	6
Fed. Selan. £20,000 fully paid	5–$5\frac{1}{4}$	—	nil	—
Java Rubber & Produce, £35,000 (£1) 15/- paid (4% guaranteed until 1909) ...	$\frac{1}{8}$–$\frac{1}{4}$ pm	—	4	4
Klanang Produce (£20,000)	$5\frac{3}{4}$–$6\frac{1}{4}$	$7\frac{1}{2}$	15	$3\frac{1}{2}$
Linggi Plantations, £30,000 Ord. fully paid ...	6–$6\frac{1}{4}$	4	15	$3\frac{1}{2}$
,, ,, £10,000, (£1) f. paid, 7% pf. ...	$1\frac{1}{16}$–$1\frac{3}{16}$	7	7	6
Malacca Rubber, £115,000 $7\frac{1}{2}$% c. pf. (£1) ...	$1\frac{1}{8}$–$1\frac{1}{4}$	$7\frac{1}{2}$	*$3\frac{3}{4}$	6
,, ,, £185,000, Ord. (£1) ...	nom.	—	—	—
Monerakelle Rubber, (£16,400) 12/6 paid ...	par $\frac{1}{8}$ pm	—	—	—
Pataling, £20,000 Ord., £5,000 Mtge. ...	$8\frac{1}{2}$–9	20	40	$5\frac{3}{4}$
Seafield Rubber, £48,000 (£1), 7/6 paid ...	$\frac{3}{8}$–$\frac{1}{2}$ pm	—	—	—
,, ,, £48,000, Ord. (£1), fully paid ...	$1\frac{1}{4}$–$1\frac{3}{8}$	—	—	—
Selangor, £48,000 Ord. (2*s.*) fully paid ...	19/0-20/0	(*f*) 20	40	$4\frac{1}{2}$
Shelford Rubber Estates, £65,000 (£1) f. pd. ...	$1\frac{1}{16}$–$1\frac{1}{8}$	—	nil	—
Sungei Salak, £41,000 (£1), 5/- paid ...	$\frac{1}{8}$–$\frac{1}{4}$ pm	—	—	—
Sungei Choh, £45,000 (£1), 10/- paid ...	4/6–5/6 pm	—	—	—
Sungei Way, £41,920 Ord. (£1), 12/6 paid ...	$\frac{7}{8}$–1 pm	nil	nil	—
Vallambrosa, £50,000 Ord.	$9\frac{3}{8}$–$9\frac{5}{8}$	—	55	7
Yam Seng, £28,600 Ord.	$2\frac{1}{4}$–$2\frac{3}{8}$	5	*$3\frac{3}{4}$	$2\frac{1}{2}$

* Interim Div. (*a*) A/c of Arrears. (*c*) Including 1% bonus. (*d*) Including $2\frac{1}{2}$% bonus. (*e*) For year 1903/4. (*f*) Paid in Sungai Way Shares. (*g*) For 6 months' working.

Penang.

Abstract of Meteorological Readings in the Criminal Prison Observatory for the month of July, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Mean Maximum.	Mean Minimum.	Mean Range.	Mean Wet Bulb.	Mean Vapour Tension.	Mean Dew Point.	Mean Humidity.			
	Ins.	°F	°F	°F	°F	°F	°F	°F	°F	%		Ins.	Ins.
Criminal Prison Observatory, Penang ...	29·899	140·0	79·9	87·9	73·6	14·3	77·3	·833	75·6	82	N.E.	8·01	2·76

COLONIAL SURGEON'S OFFICE,
PENANG, 10*th August*, 1907.

M. E. SCRIVEN,
Assistant Surgeon.

T. C. MUGLISTON,
Colonial Surgeon, Penang.

Malacca.

Abstract of Meteorological Readings for the month of July, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
		°F	°F	°F	°F	°F	°F	°F	°F	%		Ins.	Ins.
Durian Daun Hospital ...	Not Registered.	148·6	80·0	88·3	72·9	14·8	80·1	1·050	69·2	93	N.W.	11·05	2·95

COLONIAL SURGEON'S OFFICE,

MALACCA, *26th August*, 1907.

F. B. CROUCHER,

Colonial Surgeon, Malacca.

Selangor.

Abstract of Meteorological Readings in the various Districts of the State for the month of July, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
	Ins.	°F	°F	°F	°F	°F	°F	°F	°F	%		Ins.	Ins.
General Hospital, Kuala Lumpur	29·872	147·1	80·5	90·4	71·3	19·1	76·3	0·825	73·4	79	S. W.	3·37	0·90
Pudoh Gaol Hospital ,, ...	...	...	...	...	...	...	...	...	...	...	...	4·00	0·93
District Hospital ,, ...	...	...	...	...	...	...	...	...	...	...	...	5·21	1·20
,, Klang	...	...	...	88·0	71·5	16·5	...	...	...	...	...	6·81	2·85
,, Kuala Langat	...	...	...	...	...	...	...	...	...	...	...	7·63	2·00
,, Kajang	...	...	...	86·7	76·6	10·1	...	...	...	...	...	4·33	1·17
,, Kuala Selangor	...	...	...	87·2	77·0	10·1	...	...	...	...	...	4·83	3·50
,, Kuala Kubu	...	...	...	...	...	...	...	...	...	...	...	8·02	1·89
,, Serendah	...	...	...	...	...	...	...	...	...	...	...	3·65	1·08
,, Rawang	...	...	...	89·6	70·9	18·7	...	...	...	...	...	7·16	1·37
Beri-beri Hospital, Jeram	...	...	...	...	...	...	...	...	...	...	...	6·93	2·00
Sabah Bernam	...	...	...	...	...	...	...	...	...	...	...	1·71	·75

A. J. McCLOSKY,

Acting State Surgeon, Selangor.

State Surgeon's Office,

Kuala Lumpur, *27th August*, 1907.

Perak.

Abstract of Meteorological Readings in the various Districts of the State for the month of July, 1907.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Taiping ...	...	151	82·01	93	71	22	77·83	898	...	82	...	13·44	2·73
Kuala Kangsar ...	...	...	80·95	93	70	23	76·20	841	..	79	...	4·37	·95
Batu Gajah ...	...	157	81·62	92	72	20	76·71	852	...	78	...	2·44	1·17
Gopeng ...	...	...	81·00	92	64	28	76·39	849	...	80	...	7·22	2·00
Ipoh ..	...	...	81·18	94	73	21	77·36	884	...	84	...	4·53	2·54
Kampar ...	...	...	81·20	92	69	23	77·13	877	...	83	...	10·52	3·24
Teluk Anson ...	...	...	82·12	92	68	24	77·20	868	...	79	...	5·83	1·55
Tapah ...	...	...	81·03	92	62	30	76·12	834	...	78	...	12·11	3·25
Parit Buntar ...	...	...	81·91	93	70	23	76·77	851	...	78	...	6·83	2·75
Bagan Serai ...	...	...	82·09	92	71	21	77·15	865	...	79	...	6·68	2·18
Selama ...	...	...	81·54	92	70	22	76·95	864	...	80	...	8·35	2·03

STATE SURGEON'S OFFICE,
TAIPING, *26th August*, 1907.

M. J. WRIGHT,
State Surgeon, Perak.

Pahang.

Abstract of Meteorological Readings in the various Districts of the State for the month of July, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
	Ins.	°F	°F	°F	°F	°F	°F	°F	°F	%		Ins.	Ins.
Kuala Lipis ...	...	...	...	92	67	20·16	74·8	...	...	...	...	8·66	2·00
Raub ...	...	...	...	92	67	19·72	...	...	...	...	...	4·87	1·20
Bentong ...	...	...	...	93	66	19·96	74·42	...	...	...	...	4·45	1·55
Temerloh ...	...	...	...	94	71	17·83	...	...	...	...	...	3·74	1·43
Pekan ...	...	...	...	90	71	14·69	...	...	...	...	...	7·51	2·35
Kuantan ...	...	...	...	92	71	17·74	...	...	...	...	...	7·82	1·50

W. H. FRY,

State Surgeon, Pahang.

State Surgeon's Office,

Raub, *23rd August*, 1907.

The Duff Development Company, Limited, Kelantan.

Abstract of Meteorological Readings for the month of July, 1907.

District.	Temperature.			Rainfall.	
	Maximum.	Minimum.	Range.	Total Rainfall.	Greatest Rainfall during 24 hours.
	Mean. °F	Mean. °F	Mean. °F	Inches.	Inches.
Kuala Lebir ...	86·8	71·1	15·7	7·90	1·93
Kuala Kelantan ...	87·0	73·1	13·8	8·30	1·44
Taku Plantation ...	...	...	...	7·63	2·02

SURGEON'S OFFICE,

KUALA LEBIR, 15*th August*, 1907.

JOHN D. GIMLETTE,

Surgeon.

Penang.

Abstract of Meteorological Readings in the Criminal Prison Observatory for the month of August, 1907.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Mean Maximum.	Mean Minimum.	Mean Range.	Mean Wet Bulb.	Mean Vapour Tension.	Mean Dew Point.	Mean Humidity.			
	Ins.	°F	°F	°F	°F	°F	°F	°F	°F	%		Ins.	Ins.
Criminal Prison Observatory	29·906	142·3	79·3	88·0	72·9	15·1	76·7	·862	75·0	82	North	4·68	·96

COLONIAL SURGEON'S OFFICE,
PENANG, 12*th September*, 1907.

M. E. SCRIVEN,
Assistant Surgeon.

T. C. MUGLISTON,
Colonial Surgeon, Penang.

Malacca.

Abstract of Meteorological Readings for the month of August, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
	Ins.	°F	°F	°F	°F	°F	°F	°F	°F	%		Ins.	Ins.
Durian Daun Hospital	Not Registered.	149·6	80·2	87·7	72·7	15·3	81·1	1·049	68·7	93	S. W.	5·66	1·42

Colonial Surgeon's Office,
Malacca, *28th September*, 1907.

F. B. CROUCHER,
Colonial Surgeon, Malacca.

Selangor.

Abstract of Meteorological Readings in the various Districts of the State for the month of August, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension	Dew Point.	Humidity.			
	Ins.	°F	°F	°F	°F	°F	°F	°F	°F	%		Ins.	Ins.
General Hospital, Kuala Lumpur	29·884	150·8	80·9	90·3	70·6	19·7	76·2	73·0	0·818	77	S.W.	0·72	0·72
Pudoh Gaol Hospital ,, ...	...	...	...	...	...	...	...	...	...	...	...	1·73	1·23
District Hospital ,, ...	...	...	...	...	...	...	...	...	...	...	...	1·60	1·02
,, Klang	...	...	...	88·2	70·5	17·7	...	...	...	...	...	2·83	0·93
,, Kuala Langat	...	...	...	...	...	...	...	...	...	...	...	2·95	1·05
,, Kajang	...	...	...	87·5	76·0	11·5	...	...	...	...	...	1·31	0·61
,, Kuala Selangor	...	...	...	88·5	77·6	10·8	...	...	...	...	...	0·31	0·20
,, Kuala Kubu	...	...	...	...	...	...	...	...	...	...	...	3·79	2·40
,, Serendah	...	...	...	...	...	...	...	...	...	...	...	1·90	1·19
,, Rawang	...	...	...	91·0	70·5	20·5	...	...	...	...	...	2·65	1·10
Beri-beri Hospital, Jeram	...	...	...	...	...	...	...	...	...	...	...	0·90	0·40
Sabah Bernam	...	...	...	...	...	...	...	...	...	...	..	0·94	0·32

A. J. McCLOSKY,
Acting State Surgeon, Selangor,

State Surgeon's Office,
Kuala Lumpur, 17*th September*, 1907.

Perak.

Abstract of Meteorological Readings in the various Districts of the State for the month of August, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Taiping ...	...	149	82·69	93	70	23	77·39	868	...	78	...	4·45	1·80
Kuala Kangsar ...	...	...	80·62	93	69	24	74·75	784	...	75	...	2·06	·95
Batu Gajah ...	...	156	81·90	93	71	22	76·84	854	...	78	...	1·60	·40
Gopeng ...	...	...	82·13	94	63	31	75·97	814	...	74	...	2·00	·88
Ipoh ...		...	81·10	93	74	19	76·62	856	...	78	...	3·83	1·60
Kampar ...	...	...	81·77	94	68	26	76·12	826	...	77	...	·97	·61
Teluk Anson ...	...	...	81·96	92	68	24	76·88	854	...	78	...	·49	·16
Tapah ...	...	...	81·04	93	64	29	75·58	810	...	76	...	1·33	·65
Parit Buntar ...	...	...	82·84	92	71	21	77·02	852	...	76	...	1·58	·57
Bagan Serai ...	...	...	82·49	92	71	21	76·81	847	...	77	...	4·56	2·87
Selama ...	...	...	81·81	94	70	24	76·10	826	...	76	...	2·91	1·30

State Surgeon's Office,
Taiping, *20th September*, 1907.

M. J. WRIGHT,
State Surgeon, Perak.

Pahang.

Abstract of Meteorological Readings in the various Districts of the State for the month of August, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature. Mean Dry Bulb.	Temperature. Maximum.	Temperature. Minimum.	Temperature. Range.	Hygrometer. Mean Wet Bulb.	Hygrometer. Vapour Tension.	Hygrometer. Dew Point.	Hygrometer. Humidity.	Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
	Ins.	°F	°F	°F	°F	°F	°F	°F	°F	%		Ins.	Ins.
Kuala Lipis ...	...	...	77·95	94·0	66·0	21·58	74·54	...	...	...	...	1·62	·64
Raub ...	...	...	84·61	93·5	63·0	21·64	72·88	...	...	...	...	·59	·30
Bentong ...	...	...	80·25	94·0	65·0	21·79	74·38	...	...	...	...	·74	·28
Pekan ...	...	...	79·25	94·0	70·0	15·45	74·64	...	...	...	...	1·69	·56
Temerloh ...	...	...	...	94·0	69·0	19·70	...	...	...	...	...	3·26	1·88
Kuantan ...	...	...	85·4	95·0	69·0	18·70	76·16	..	...	...	...	6·10	5·20

From the 15th of July to the end of August was a period of unprecedented drought in Ulu Pahang.

STATE SURGEON'S OFFICE,
RAUB, 20th September, 1907.

W. H. FRY,
State Surgeon, Pahang.

AGRICULTURAL BULLETIN

OF THE

STRAITS

AND

FEDERATED MALAY STATES.

No. 11.] NOVEMBER, 1907. [Vol. VI.

LALANG AS A PAPER MATERIAL,

By H. N. Ridley.

This too abundant grass has on more than one occasion been suggested as of value as a paper-making material and many years ago a patent was taken out for its use in this business. Experiments, on the grass and other possible paper-making stuffs, were made in the Botanic Gardens, Singapore, and an account of the results was published in the first series of the *Bulletin.*

At that time, however, the abundance of wood pulp and its general use in paper-making militated against the use of Lalang, and no progress was made in utilizing this grass. In 1891 a concession for paper-making from lalang and banana stems was obtained from the Sultan of Johore, and analyses of the fibre made by Messrs. Cross and Bevan, and Mr. C. Beadle, who has kindly allowed me the use of a copy of the reports on this subject from which I make the extracts quoted below, and who also showed me samples of paper made from the grass.

In this prospectus for a company to work the grass in Johore it was proposed to put a factory about four or five miles west of Johore town, and others on the East Coast and in the neighbourhood of Muar. "The cost of cutting and delivering the Lalang at the factory was estimated at less than ten shillings a ton, but the concessionaire preferred to estimate it at 15 shillings a ton. Paper manufacturers of high standing who have experimented on Lalang grass have classified it as being equal to the best qualities of Esparto, which yield nearly 50 per cent of fibre. First-class Esparto commands at present (1891) ruling rates £6 to £6 10*s.* 0*d.* per ton at port of delivery in Great Britain. Thus Lalang grass in Johore starts at the outset as raw material with the very material advantage of about £4 per ton over Esparto in Britain and with equal economical facilities for manufacture."

Messrs. CROSS and BEVAN'S report is as follows:—

Sample of Grass from Johore.

We have completed our analysis of the above and beg to report as follows:—

Moisture	10·8
Ash	1·9
Cellulose or pure fibre	49·0

"(Air dry with 10 per cent of moisture.) We find the fibre to wash freely on the wire, in other words it is free from the gelatinous constituents which render a fibre unworkable on the paper machine. We are surprised to find such a very high yield of fibre, this yield taken together with the low percentage of mineral matter (ash) shows it undoubtedly to be a good paper-making fibre. The former is satisfactorily high as the latter is low. We have examined the separate fibres under the microscope and compared them with Esparto. The average length is about equal to that of the latter, but the longer fibres of the Lalang grass run about 20 per cent longer than the longest Esparto fibres. The fibres are somewhat greater in diameter and thinner walled. We should expect the fibre to be inferior to Esparto in regard to bulking but its clay-carrying powers to be superior. The grass can be readily treated to yield a high class 60 per cent crude pulp removing about 40 per cent of the raw fibrous constituents. A halfstuff of this character could be press-packed to a very small bulk, and as it would yield about 80 per cent of pulp to the paper maker, with a relative small expenditure for chemicals, should command something like twice the price of Esparto. The fibre is, undoubtedly, well worth attention from the paper making point of view."

Report of Process of Pulping.

"One kilogram grass boiled 5 hours under pressure rising to 50 lbs. Caustic Soda used (76 per cent alkali) 150 grammes. Excess at end of experiment 40 grammes. The grass can be boiled on working scale with 15 per cent its weight of ordinary (60 per cent) Caustic, conditions 5 hours at 50 lbs. Pulp washed and bleached in usual way; consumption of bleaching powder 10 per cent of the weight of raw material.

Though the sample is not bleached to the highest colour we anticipate no difficulty in getting a full bleach on a large scale. It works very freely on the wire (*i.e.* parts easily with water). The fibres are thinner walled and longer than those of Esparto; they appear to bulk equally well and give a much tougher sheet. It will hold the loading material well and take a good surface in the calendar. The value of the material we certainly think equal to that of the highest qualities of the Esparto grass."

(Sd.) CROSS & BEVAN.

This experiment was followed up by more practical investigations with half a hundred weight sample, the experiments being carried out in the model-plant of Messrs. WM. JOYNSON & SON, St. Mary Cray, and the following notes are taken from this report—" The fibre was passed through a chaffcutter and cut into lengths of about 4 inches. The cut fibre was boiled in 5 times its weight of soda liquor containing 15 per cent (of 77 per cent) caustic on the weight of the grass in a cylindrical revolving boiler. At the end of the boiling the fibre was found to have been completely resolved into pulp as is obtained on boiling Esparto. The liquor contained 3 per cent of free alkali on fibre, showing that the grass consumed only 12 per cent. The unbleached pulp was then filled into a breaker, where it was broken up and washed; it was then treated with 12 per cent bleaching powder for one hour subsequently in a steeping tank. One hundred pounds grass yield 55 lbs. of unbleached pulp containing 85 per cent Cellulose, or 46 lbs. of bleached pulp containing 98 per cent Cellulose."

" We may note the following points in regard to the working of the Lalang pulp: when used without admixture with other fibres it makes a paper suitable for high class printings such as illustrated papers and journals. It takes a good surface under the calendar which imparts to it a glossy feel and appearance. On account of the peculiar nature of its fibres it is capable of carrying a large amount of mineral loading, sample 4 containing as much as 40 per cent. It may also be used alone for medium class writing papers. When used in conjunction with rags by the addition of 20 per cent medium quality linen rag (commercial price about £16 per ton) a high class writing paper can be produced, which felts into a hard and compact paper and after animal sizing will stand the severest ink test.

We should not recommend manufacturing paper from this fibre, in the unbleached state, as we think it is too good for the purpose, and also it is easily bleached to a full white. As pulp it will no doubt find a ready market. In Australia it will be valuable and almost certain to command extensive consumption by paper makers in Melbourne who at present are unable to produce high class papers for want of a suitable raw material and the close proximity of Johore ought to reduce freight to a minimum. We have no hesitation in saying that at present ruling prices for half stuffs the unbleached would readily command in Melbourne market £11 to £13 per ton, and the value of the bleached sample would be from £15 to £17 per ton. '(This it will be remembered was written in 1891, so that some alteration in prices may be expected.)' When viewed under the microscope the Lalang fibres resembles those of Esparto but they are somewhat longer, larger in diameter and thinner walled; moreover, the Lalang contains more variety of fibres which we believe will add greatly to its paper making qualities.

As to the comparative value of the Lalang and Esparto grass for paper making purposes we note that the Lalang yields 46 per cent of pure Cellulose, as against about 48 per cent for the highest

class of Esparto, that the cost of treatment is about the same. We are disposed to think that Lalang is of more general and of somewhat higher value. By varying the chemicals and mechanical treatment of Lalang and by cutting it at different stages of its growth and by a slight admixture of other fibrous materials, a great variety of papers may be made varying from strong wrapping papers to high class writing papers. When working on a large scale we anticipate no difficulty in getting the pulp perfectly clean and free from spots.

"*Musa paradisiaca*, the plantain, can be utilized for the manufacture of very strong paper. The raw material can be more easily resolved if put into the boilers in the undried condition and we may expect that by this means a bleached product may be obtained of good enough colour to mix with Lalang stock."

Figures showing the cost of producing one ton of unbleached pulp from Lalang £6-5-10 and of one ton bleached, £9-5-0 are given and it is noted that about half the caustic soda can be recovered by an evaporator reducing the cost to £4-15-4 and £7-9-10 respectively. It requires 2 tons 12 cwt. to produce a ton of unbleached and 3 tons 1 cwt. 20 lbs. to produce one ton bleached. It will thus be seen that in many points the troublesome Lalang is superior to the valued Esparto grass for paper making and a manufacture of halfstuff would probably pay well. It would not be advisable to attempt shipping the grass untreated as it is very bulky and would be likely to fire on the way. Halfstuffs made in Singapore could be pressed into compact bales and readily shipped.

Although many Lalang wastes in the Peninsula are being cleared and put under cultivation for rubber and other plants, still the supply of the grass is sufficiently large to make a very large amount of halfstuff, and its rapid growth after cutting would allow of a very large constant supply. One particular advantage of Lalang should be noted, that its purity from extraneous weeds, over very large areas. There would be little need for sorting out objectionable matter in collecting the grass. The advantage to the world in substituting as a paper stuff the worthless and noxious Lalang for the timber worked up into wood pulps needs no pointing out.

It is difficult just now to induce any one to consider any other cultivation or manufacture than that of rubber, but there is it appears a distinct opening for the manufacture of pulps from Lalang grass which we may hope to see put into practice.

It is possible, too, that the waste Citronella and Lemon grass after the extraction of the oil may be of equal value and this would add considerably to the profits of the Citronella and Lemon grass cultivators, and it is desirable that experiments on this waste product similar to those on the Lalang should be carried out.

PARA RUBBER SEED.

The prices which are obtainable at the present time for Para Rubber seeds for planting purposes being so high, other means of disposing of them are not necessary, but with hundreds of thousands of trees becoming seed-bearers the supply of seed for planting will soon be in excess of the demand.

The commercial value of the seed of Hevea braziliensis has up to the present been rated on the amount and quality of the oil it possesses. This oil is similar in its character to Linseed oil and for the manufacture of paints, varnishes, etc., and other purposes for which Linseed oil is used Para seed oil compares favourably.

The following analysis of Para seed oil shows its composition which in comparison to Linseed is as good or better in everything except in Iodine value:—

Specific gravity at 15° C.	0·9303
Free fatty acids—Acid value	10·7
Calculated oleic acid	5·4 per cent
Ester value	195·4
Neutral oil	94·6
Saponification value	206·1
Iodine value	128·3

The oil has not yet been obtained in sufficient quantities for its qualities to be adequately tested but manufacturers have offered a price of £10 to £12 per ton for decorticated seed in good condition.

In order to estimate the weight which may be expected per acre or per 100 trees, I weighed in Ceylon, a large number of seeds between 7,000 and 8,000, and found the average weight of each seed to be $\frac{3}{20}$ths of an oz. or 111 seeds to 1 lb.

The shell of the seed has as far as we know at present no commercial value and in order to save bulk in should be removed before shipping.

It has been found that the loss in oil in decorticated rubber seed during transit to Europe is very little.

To find the relative weight of shell and kernel, I carefully weighed a few average seeds, and after taking the shell off weighed shell and kernel separately. The relative weight of kernel to shell is found to be 59·7 or approximately 60 per cent.

WEIGHT OF HEVEA BRAZILIENSIS SEED, COTYLEDONS AND SHELL.

Number.	Total weight.	Shell.	Cotyledons.	Percentage of Cotyledons to total weight.
	Gr.	Gr.	Gr.	Per cent.
1	3·18	1·69	1·58	50
2	5·14	1·84	3·28	66
3	4·26	1·63	2·61	62
4	4·41	1·70	2·70	61
5	4·19	1·33	2·86	68
6	4·46	2·05	2·41	52
7	3·50	1·65	1·85	53
8	3·86	1·96	1·89	49
9	3·14	1·41	1·73	55
10	3·21	1·48	1·72	53½
11	3·26	1·35	1·90	58·28
12	4·65	1·89	2·49	53·54
Totals ...	47·286	19·88	27 02	...
Averages	3·938	1·656	2·25	59·7

The following will enable an estimate to be made of probable profits from this source:—

111	Para rubber seeds	=	1 lb.
12,432	,, ,,	=	1 cwt.
248,640	,, ,,	=	1 ton.

The kernel *i.e* the decorticated seed is 60 per cent of the total weight of seed, therefore 414,400 seeds will make a ton of decorticated seed. At 400 seeds *i.e.* 133 fruits to the tree 414,400 seeds will be the crop of 1,036 trees which at 193 trees to the acre *i.e.* 15 feet apart is the produce of 5·4 acres. One acre will therefore give 3 cwts. 79 lbs. value £1-17-0 or $15.88.

Cost of putting on market:—

	$	c.
Freight 40*s.* per ton (say $18)	18	00
Collecting at 4 cents per 1,000, per ton ...	18	64
Decorticating, per ton	2	50
Packing, per ton	15	00
	54	14
Value on market £10 to £12 (say $93.50 *i. e.* £11)	93	50
Cost of putting on market	54	14
Total net profit per ton ...	39	36

that is 5·4 acres give $39.36 profit *i. e.* $7.00 per acre.

In these prosperous times when rubber profits are calculated by hundreds of dollars per acre, the discussion of an additional profit of $7 per acre may seem trivial, but since the seed cannot be allowed to remain in the ground and must be removed, some steps must be taken to deal with it. When a constant and large bulk of rubber seed is sent to Europe it is possible that the price of this commodity may increase very considerably and become an item of importance in the profits of a Rubber Estate.

The value of the seed for cattle cake has not yet been estimated, the seed is greedily eaten by animals and has a high nutritive figure.

Consignments of the present crop decorticated and with the shell on are being sent home by the Department of Agriculture and the market values and condition of these on reaching Europe will be made the subject of a further note.

J. B. CARRUTHERS.

GUAYALE RUBBER.

A short time ago the home papers had paragraphs about a new rival of Para rubber planting in the shape of Guayale Rubber which has come into considerable prominence within the last couple of years. The following notes may allay fears and are of interest, they are chiefly obtained from important article by Dr. R. ENDLICH, on the present position and outlook of the Guayale industry in the July number of the *Tropenpflanzer*, the organ of the German Colonial Economic Committee.

The source of Guayale is "*Parthenium argentatum* A. Gray," a shrub, with an average height of two feet, growing on the plateaux of Mexico. It appears to thrive best in a dry climate and on soils containing a good deal of lime, in fact it is doubtful if it is suited

for any land except desert-like wastes similar to those in Mexico, outside of which it will probably never attain any importance. The rubber is not in laticiferous vessels, but in scattered cells, about two-thirds being in the bark. It is extracted not as liquid latex, but from chopped or ground-up pieces of the stem and branches of the shrub by mechanical or chemical treatment, the processes for which are all patents, more or less secret.

The mechanical methods are cheapest, but the rubber contains more pieces of wood than when extracted chemically. Mostly Alkalies are used in the chemical processes, other chemicals are too dear in Mexico. The difficulty of extraction renders large Companies and plant a necessity. There are only fifteen Companies at present engaged in the entire industry, though the export was 2,700,000 lbs. in the last six months of 1906 and 700,000 lbs. in January of this year. (Exports from Brazil from the year 1906 were 15,774,840 lbs.)

Older plants yield a higher percentage of rubber than younger ones, the plant cannot be profitably used until it is at least five years old, and as a rule ten years must elapse from time of sowing seed until the plant is ready for harvesting, but it appears that the new shoots which grow on the cut down stems may be collected after five years. Whether a third crop will follow cannot be stated with certainty.

The chopped-up material gives from 7 to 10 per cent caoutchouc; the age of the tree and the dryness of the material effecting the percentage. There are a want of data concerning the composition of the rubber. The Director of a large Company asserts that their rubber contains 20 per cent of resins; it would appear that well-prepared stuff contains from 50 to 70 per cent caoutchouc and from 12 to 20 per cent resins, with from 3 per cent upwards of water.

Guayale rubber as put on the market contains considerable quantities of woody fibre, which the methods of extraction have been unable to take away. This makes washing considerably difficult for manufacturers, and special machines have been designed for the purpose. This may account for its neglect by British manufacturers, though it has proved itself a middle-grade rubber, suited to many commercial applications and offering certain advantages in vulcanisation. It is used mostly by American and German manufacturers, who have found it worthy of attention during the present high prices for Para.

It does not appear on the lists of London Brokers, but the *India Rubbe World* quotes its price in New York on the 30th July last as 2*s*. per lb., and the highest price of Para on the same date as £0-4-11, and fine Ceylon as £0-5-7.

The Companies are mostly German, and the advent of an American combination in 1906, which attempted to gain complete control of the industry according to American Trust Methods, lowered the

price considerably, but it improved again and recently good qualities fetched as high as £0-2-3 per lb. in Hamburg.

Exact details as to cost and profit per acre are not available, but at present prices Guayale is a profitable business. In some cases the raw material (plant) must be transported long distances on donkeys which adds considerably to its cost, and this factor will increase as the more accessible districts are completely exploited. The production per acre is variable and difficult to estimate on account of the very unequal sizes of individual plants; it has been stated to lie between 450 and 750 lbs. Further, while there are 15 factories working now there was only one actually at work in 1905, so that the primitive accessible supply must be quickly exhausted, and cost of production of raw material proportionately increase; besides if there is any considerable drop in the prices of Para, a demand for Guayale may not continue. The manager of the Continental Rubber Co. in Mexico, estimates the present visible supply as sufficient for 7 years. The manager of the Company which has just been started to work the Guayale areas in Texas asserts that there are only about 10,000 tons of shrub available in the State. Dr. ENDLICH believes that no immediate danger threatens the Guayale industry, the second growth, he says, thrives often better than the first. Guayale, he says, offers a good opening to extract profit from desert-like districts, especially as a secondary industry in connection with ranching, and the plant may increase the value of similar comparatively unfertile areas in other countries.

W. J. GALLAGHER.

TAPPING PATTERNS.

THE "CHAIN-GAMMA."

The Editor,

"Agricultural Bulletin,"

Singapore.

DEAR SIR,—All methods of tapping rubber trees are, one may say, combinations or variations of the oblique incision and probably the two most popular methods in use in Malaya at present are the V and the herring-bone. It is objected however to the former that so many cups are required. The latter is frequently to be seen deprecated on account of the central channel which is a mere conductor of latex, being unproductive in itself and wasteful of cortex. It is said also that it lessens the tension of the bark and therefore tends to minimise the output of rubber. If such is so with the full herring-bone, how much more proportionately is the vertical channel uneconomical in the case of the half-herring-bone!

Examining recently a series of trees tapped by the latter method it appeared to me that if the length and position of the conducting channel were somewhat altered it could be made both productive of

latex and thus less wasteful of bark while, besides, the natural tension would probably remain unaffected.

I therefore sketched out the following pattern (Fig. 1 the dotted line representing the original vertical channel) of a modified half-herring-bone—I should like to say improved, but from lack of opportunity to test it cannot yet do so—which, if we desire to stick to the alphabet for tapping nomenclature, instead of a number of Roman Vs occupying the tree at intervals, might be described as a column of Greek Ys ascending the trunk—ascending because tapping must be done from base upwards.

A very symmetrical pattern that would probably heal rapidly is also obtained by reversing each alternate Y.

Having gone so far it was of course obvious that the alteration should be carried to its logical conclusion and thus Fig. 2 was obtained.

The basis of the method is itself a very simple pattern, productive throughout all its length. This is a continuous regular zig-zag, but I am not aware that it has been experimented with in this form for the orthodox zig-zag seems to be two oblique cuts joined by a vertical, and so useless, channel. The advantage of the full pattern however is that the flow from the lateral projections at once forms a leading stream which is joined by the decending latex from each step above as tapped, and so obviates any likelihood of delay or overflow at the angles.

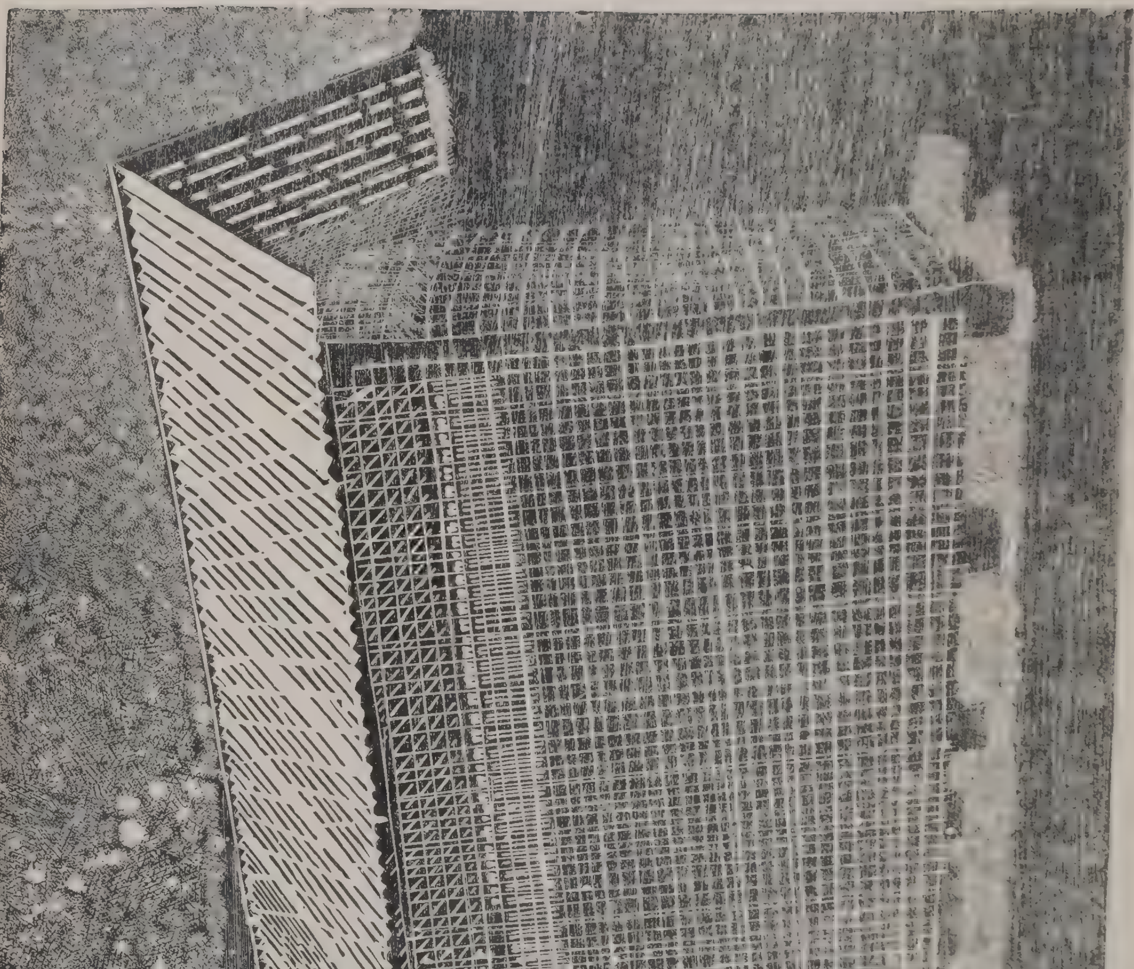
I fancy that the pattern will be found very productive and of value when it is required to obtain a large amount of rubber per tree. The proportion of scrap will probably be small owing to the strong flow of latex throughout; the fluid from above helping to wash down that below and thus differing from the ordinary herring-bone where the latex in the lateral cuts soon begins to coagulate.

From time to time various tapping patterns have been tried and found unsatisfactory, the single incision, for instance, and the Ceylon spiral which is now being regarded as hardly fulfilling all that was expected of it, and the above ideas will perhaps find a place in the same category, but as I am at present unable to experiment with them myself I should be glad to hear, through your pages, what results have been obtained by any one who thought the notions worthy of a trial.

Yours sincerely,

C. BODEN KLOSS.

SINGAPORE, *4th November,* 1907.



FOREST OFFICE,
TAIPING, 5*th September*, 1907.

To the Editor,

"Agricultural Bulletin,"

Singapore.

Sir,—I think that a photo of my new Invention for Permanent Plant Houses for the East or any country which has an equitable hot climate like the Straits Settlements will be of interest to your readers.

2. The photo shows a roof made of single length sheets of corrugated zinc 7 feet long but no doubt the material could be had of any length. In making a larger building care should be taken not to cut the zinc over the line of the roof frame-work as if this is done the frame would get wet and water drip from it during rain storms. If the supporting frame-work were laid 6 feet apart, 8 inches or so at either end of the zinc should remain uncut to allow for the overlap over the frame-work.

3. If necessary the sides of the building could be made of the same perforated corrugated sheets.

4. It will be noticed that the zinc should be cut on the ridge part only leaving the guttering to carry off the water.

5. I was granted a Diploma for this invention at our Agri-Horticultural Show held last month at Kuala Kangsar.

I have, etc.

A. W. STEPHENS,

Deputy Conservator of Forests, Perak.

THE RUBBER MARKET.

In Rubber shares there has been a general marking down in all quotations, but the undertone may be regarded as very satisfactory, there being a number of buyers at the lower quotations, but stock is difficult to get in any quantity. The market for hard, fine Para is firmer, and plantation rubber, consequently, is fractionally dearer.

Anglo-Malays fully paid are $4\frac{7}{8}$–$5\frac{1}{8}$ and the partly paid have been dealt in round about $4\frac{1}{16}$. Batu Tigas are 23*s*.-24*s*. and Bukit Rajahs are 6-$6\frac{1}{4}$ ex rights. Cicelys are for sale at about $5\frac{1}{2}$ and the Preference are steady at 6-$6\frac{1}{2}$. Consolidated Malays are $3\frac{1}{4}$-$3\frac{3}{4}$ and Damansaras are offered at $1\frac{1}{2}$, Federated Selangors are asking for a bid, and Golden Hopes have been dealt in at $1\frac{7}{8}$. Highlands fully paid have been freely dealt in at $3\frac{1}{8}$ and the partly paid are $1\frac{1}{4}$-$1\frac{3}{8}$. Java Rubber and Produce are steady round about $\frac{1}{4}$ prem. and Kepitigallas are £0-19-6-£0-20-6. Klanangs are 5-$5\frac{1}{4}$ and Kuala Lumpurs have freely changed hands at 30*s*. to 31*s*. Linggi new shares are a good market with buyers at 12*s*. 6d., but Lunuvas are asking for a bid. Malacca Ordinary have been taken in large

numbers round about 18*s*., but Pataling are not better than $7\frac{1}{2}$-8. Pelmadullas are round about 1-$1\frac{1}{8}$ prem. and Peraks are 20*s*. Rubber Estates of Ceylon are sellers at $\frac{3}{4}$ prem. and Seafields are $\frac{1}{2}$-$\frac{9}{16}$. Selangors are £0-19-6 to £0-20-6, Shelford are round about 21*s*., and Straits Settlement (Bertams) are round about $\frac{3}{4}$. Sumatras are $2\frac{1}{16}$, but Sungei Chohs are asking for offers. Sungei Kapars are inquired for, but Sungei Ways are sellers at $1\frac{3}{8}$ prem. Tremelbyes changed hands at 10*s*. 9d. prem. and Vallambrosas are $8\frac{1}{2}$-9. United Serdangs have been an active market at 10*s*. to 11*s*. prem. In new issues North Hummocks have been freely dealt in round about 5*s*. prem. and close 4*s*. to 5*s*. prem. A good deal of interest is centred around the forthcoming issue of the Lanadron Johore Rubber Company, Limited, the prospectus of which is expected on Saturday.

Subjoined are particulars of the principal companies whose shares are dealt in on the London market:

RUBBER-PRODUCING COMPANIES.

Issued share Capital.	Share.	Paid.	Company.	Acres cultivated.	Price.
	£				
104,937	1	1	Anglo-Malay, fy ...	1,713	$4\frac{7}{8}$-$5\frac{1}{8}$
	1	15/	Do. partly ...		$3\frac{7}{8}$-$4\frac{1}{8}$
15,250	1	1	Batu Caves ...	1,587	4-$4\frac{1}{2}$
50,000	1	17/6	Batu Tiga ...	455	23/-24/
66,700	1	1	Bukit Rajah ...	2,268	6-$6\frac{1}{4}$ xr
6,000 ord.	1	1	Cicely Rubber Estates ...	594	$5\frac{1}{2}$-6
6,000 5% pf.	1	1			$6\frac{1}{4}$-$6\frac{1}{2}$
55,000	1	1	Consltd. Malay Rubber Est.	1,460	$3\frac{1}{4}$-$3\frac{3}{4}$
18,251	1	1	Fed. Selangor ...	908	5-$5\frac{1}{2}$
33,250	1	1	Golden Hope ...	470	$1\frac{7}{8}$-2
181,454	1	1	Highlands and Lowlands fully	2,086	$3\frac{1}{8}$-$3\frac{3}{8}$
164,728	1	10/	Highlands and Lowlands partly		$1\frac{1}{4}$-$\frac{3}{8}$ pm
200,000	1	1	Kepitigalla ...	3,214	19/6-20/
20,000	1	1	Klanang Produce ...	745	$5\frac{1}{2}$-6
180,000	1	1	Kuala Lumpur ...	1,566	30/6-31/6
32,332	2/	2/	Linggi Plantations ...	2,080	12/-13/
185,000 ord.	1	1	Malacca ...	3,300	$\frac{7}{8}$-1
115,000 $7\frac{1}{2}$% p. pf.	1	1			25/-26/
17,500	1	1	Pataling ...	800	$7\frac{1}{2}$-8
25,750	1	1	Pelmadulla ...	324	$1\frac{1}{16}$-$1\frac{1}{8}$ pm
	1	10/	Pelmadulla ...		
100,000	1	7/6	Seafield ...	1,224	$\frac{1}{2}$-$\frac{5}{8}$ pm
29,075	2/	2/	Selangor ...	1,635	19/6-20/6
65,000	1	1	Shelford ...	584	20/6-21/6
100,000	1	1	Sumatra Para ...	837	2-$2\frac{1}{8}$
32,400	1	10/	Sungei Choh ...	730	$\frac{1}{8}$-$\frac{3}{8}$
55,000	1	10/	Sungei Salak ...	1,080	par-$\frac{1}{8}$ pm
41,920	1	12/6	Sungei Way ...	1,019	$1\frac{3}{8}$-$1\frac{1}{2}$ pm
26,792	1	14/	Tremelbye ...	405	$\frac{1}{2}$-$\frac{9}{16}$ pm
140,000	1	15/	United Serdang ...	2,748	$\frac{1}{2}$-$\frac{9}{16}$ pm
50,600	1	1	Vallambrosa ...	1,244	$9\frac{1}{2}$-$9\frac{5}{8}$
28,600	1	1	Yam Seng ...	500	$2\frac{3}{4}$-$2\frac{7}{8}$

GOW, WILSON & STANTON, LIMITED—
India Rubber Market Report.

13, Rood Lane, London, E.C.
September 13*th*, 1907.

At to-day's auction, about 818 packages of Ceylon and Malaya Plantation grown rubber were under offer, of which, about 245 were sold. The total weight amounted to about 40¼ tons. (Ceylon nearly 16 tons, and Malaya over 24¼ tons).

The auction was postponed from last week in order that sales might be brought back to their regular dates, and owing to the three weeks interval, the offerings were on a rather larger scale than usual.

Following the somewhat slack private market lately ruling, demand continued irregular, and prices in most cases marked a decline of from about 1*d.* to 2½*d.* per lb. on last sale quotations, while Para was also about 2¼*d.* lower.

The highest price of the sale, *viz.*, 5/7¾, was offered for a large parcel of very fine pale pressed crepe; the lot was, however, withdrawn for a higher limit. With this exception the palest kinds were less enquired for, the best price realized for some fine Ceara biscuits being 5/2 against 5/5 at last auction.

The lower grades of crepe were generally difficult to quit, though a parcel of fine clean Rambong realized 4/6¼.

TO-DAY'S QUOTATIONS.

Sheet, etc.	
Good to Fine Sheet	5/- to 5/0¾
Ceara Biscuits	5/2
Fine Biscuits	5/- to 5/1
Crepe.	
Fine Pale and Pressed...	5/3½ to 5/7¾
Palish to darkish	4/1 to 5/-
Dark Block	3/8¾ to 4/-
Fine Blocked Sheet	5/2
Fine Rambong Crepe	4/6¼
Unwashed Scrap.	
Bid.—	
Fine	3/8 to 3/9¼
Fair to medium	3/6 to 3/7¼
Low	2/6

AVERAGE PRICE OF CEYLON AND MALAYA PLANTATION RUBBER.

To-day	245 pkgs.	4/8$\frac{7}{8}$
Corresponding sale last year ...	163 pkgs.	4/9

Plantation.		Hard Fine Para.
Fine.	Scrap.	
5/- to 5/7$\frac{3}{4}$	3/6 to 3/9$\frac{1}{4}$	4/6$\frac{1}{2}$
5/6 to 5/7$\frac{1}{2}$	3/- to 4/6	5/2

Particulars and prices as follows :—

Ceylon.

Mark.	Pkgs.	Description.	Price.
Tudugalla	13	Fine pale pressed crepe ...	bought in.
New Rasagalla	3	Good scrap ...	bought in.
	1	Barky ,, ...	bought in.
Elston	2	Good to fine biscuits ...	5/1.
	1	Scrap ...	bought in.
Udapolla	3	Good to fine biscuits ...	5/1.
	4	Good biscuits ...	5/1 (bis.)
		scrap, etc.	bought in (scp.)
Polatagama	3	Good biscuits ...	5/1.
Arapollakande	7	Very fine biscuits ...	5/1.
	1	Darkish crepe ...	bought in.
	4	Dark block part sold,	3/8$\frac{3}{4}$.
	1	Fine biscuits ...	5/1.
Culloden	7	Fine palish pressed crepe ...	5/-.
	11	arkish pressed crepe ...	4/2$\frac{1}{2}$.
	1	Dark block ...	bought in.
	8	Very fine palish pressed crepe	5/3$\frac{1}{2}$.
	5	Brown pressed crepe ...	bought in.
Culloden	1	Black ,, ...	bought in.
	1	Good brownish crepe ...	4/1$\frac{1}{4}$.
Ellakande	5	Very fine pale crepe ...	bought in.
	2	Brown pressed crepe ...	bought in.
Heatherley	6	Brown pressed crepe ...	bought in.
	3	Black pressed crepe ...	bought in.
Nikakotua	8	Good sheet ...	bought in.
	10	Dark pressed crepe ...	bought in.
Halgolle	2	Dark scrap ...	bought in.
	2	Good ,, ...	3/9.

Mark.	Pkgs.	Description.		Price.
Katugastota	1	Good scrap	...	$3/8\frac{3}{4}$.
Glencorse	1	Good biscuits	...	$5/0\frac{3}{4}$.
	2	Good scrap and cuttings	.	$3/8$ to $3/8\frac{1}{2}$.
Hattangalla	2	Fine biscuits	...	5/1.
	2	Brownish crepe	...	$3/11\frac{1}{2}$ to 4/1.
	1	Black crepe	...	bought in.
Matang	8	Fine sheet	...	$5/0\frac{3}{4}$.
Ingoya	1	Dark scrap	...	bought in.
Kipitiagalla	4	Very fine sheet	...	bought in.
	22	Darker sheet	...	bought in.
	1	Fine blocked sheet	...	5/2.
	14	Rough sheet, scrap, etc.	..	bought in.
A | R	7	Good sheet	...	bought in.
P | Co.	4	Dark Rambong, crepe etc.	...	bought in.
Dangan	1	Good biscuits	...	bought in.
Kumbukkan	2	Fine ,,	...	bought in.
	2	Uncured lump scrap, etc.	part	sold, $3/7\frac{1}{4}$.
C B	1	Good biscuits	...	bought in.
Kahagalla	10	Very fine palish worm	...	bought in.
	1	Darker	...	bought in.
	2	Good scrap	part	sold, 3/7.
Galatura	1	,,	...	bought in.
Edengoda	1	,,	...	bought in.
Katugastota	1	Fine scrap	...	bought in.
	1	Cuttings	...	$3/9\frac{1}{4}$.
Halgolle	1	Similar	...	bought in.
New Rasagalla	2	Scrap and cuttings	part	sold, 3/9.
Maddagedera	1	Good scrap	...	3/8.
Poonagalla	1	Fine pale Ceara biscuits	..	bought in.
	1	Scrap and rejections	...	bought in.
Wavena	10	Good sheet	...	bought in.
	1	Darker	...	bought in.
	1	Scrap	...	bought in.
Goonambil	2	Good biscuits	...	bought in.
	2	Scrap	...	bought in.
Glanrhos	2	Good biscuits	...	$5/0\frac{3}{4}$.
	4	Rough ,,	...	5/-.
	3	Rejected sheet	...	bought in.
Aberdeen	8	Good to fine biscuits	part	sold, $5/0\frac{3}{4}$.
	1	Wound scrap	...	3/6.
Welkandalla	2	Dull biscuits	...	bought in.
HC	3	Mottled crepe	..	bought in.
	4	Biscuits	...	4/6 to $5/0\frac{1}{4}$.
	1	Block (4 lbs.)	...	bought in.

Mark.	Pkgs.	Description.	Price.
Imboolpitiya	1	Sheet	bought in.
	1	Scrap (5 lbs.)	bought in.
Taldua	1	Good biscuits	5/0¾.
	1	Fine scrap	bought in.
M	3	Fine pale Ceara biscuits	5/2.
	3	Scrap and rejections	3/- to 3/9.
Sarnia	2	Biscuits, etc.	part sold 5/0¾.
Rosebury	2	Fine sheet	5/0½.
	1	Darker	5/0½.
	6	Biscuits and scrap	part sold 5/0½.
Warriapolla	2	Fine pale Ceara biscuits	5/0¾.
	5	Fine biscuits	5/0¾.
	3	Scrap	3/6.
Sorana	3	Good biscuits	5/0¾.
	6	Scrap and lump	part sold 3/6.
Tallagalla	4	Good biscuits	5/0¾.
	6	Good to medium scrap	bought in.
Northumberland	1	Good biscuits and sheet	5/0¾.
Ayr	2	Good sheet	5/0½ to 5/0¾.
Clara	1	Good biscuits	5/0¾.
	1	Good scrap	bought in.
Waharaka	1	Good biscuits	5/0¾.
	1	Good scrap	bought in.
	1	Dark block	bought in.
Densworth	1	Fine biscuits	5/0¾.
	3	Fine to medium scrap	bought in.
Doranakande	3	Good biscuits	5/-.
	10	Good scrap and rejections	bought in.
Ballacadua	2	Very fine biscuits	5/1.
	3	Dark crepe	bought in.
KM	1	Block	bought in.

MALAYA.

Mark.	Pkgs.	Description.	Price.
Jebong	30	Very fine pale pressed crepe	5/7¾ bid.
	2	Mottled	bought in.
	1	Very fine to medium	bought in.
V R Co Ld. Klang FMS	1	Very fine pale crepe	bought in.
	10	Fine palish	4/10¼.
	1	Very fine pale and palish	bought in.
	9	Fine block	bought in.
	23	Dark ,,	bought in.
	3	Palish block	bought in.
P S E	8	Fine sheet	5/0¾.
	2	Dark block	bought in.
	1	Rejected sheet	bought in.

Mark.	Pkgs.	Description.	Price.
R S R	2	Rejections	bought in.
K M A B	10	Fine palish blocked crepe	bought in.
A M R Co Pataling	5	Good palish crepe	bought in.
	33	Good crepe	bought in.
	2	Black ,,	bought in.
Batu Tiga B R R Co. Ld.	4	Good biscuits	$5/0\frac{1}{4}$.
	13	Good block	bought in.
	33	Good sheet	bought in.
	15	Dark block	bought in.
	2	Brown ,,	bought in.
	2	Rambong block	bought in.
C M R E Ld. Linggi	62	Good to fine crepe	pt. sold, $4/8$ to $4/11\frac{1}{2}$.
	2	Very fine pale crepe	bought in.
	27	Very fine & palish crepe	part sold, $4/10\frac{3}{4}$.
	6	Brown	bought in.
	2	Fine palish pressed	bought in.
	13	Brown pressed	bought in.
R M P L	4	Fine block	bought in.
	8	Good ,,	bought in.
	2	Darker	4/-.
	6	Rambong crepe	$4/6\frac{1}{4}$.
Damansara	19	Good to medium crepe	bought in.
	7	Dark block	4/- to 4/2.
B & D	13	Good sheet	$5/0\frac{3}{4}$.
	1	Fine palish sheet	$5/0\frac{3}{4}$.
	1	Dark crepe (30 lbs.)	3/10.
	2	Good palish crepe	4/8.
	1	Very fine pale and palish sheet	$5/0\frac{3}{4}$.
	1	Brown crepe	2/3.
	1	Rejections	2/3.
L E Muar Straits	45	Fine block	bought in.
B M & Co.	6	Dark blocked crepe	bought in.
S P S	1	Rejections	bought in.
	2	Scrap	bought in.
	2	Rejected biscuits	bought in.
	2	Rambong	bought in.
R S S & D	2	Rejections	bought in.
	1	Cut sheet	bought in.
M	2	Black crepe	1/6.

Mark.	Pkgs.	Description.	Price.
Mc I (in diamond)	1	Thick rejections ...	bought in.
	1	Scrap ...	bought in.
B M & C	5	Rambong ...	bought in.

GOW, WILSON & STANTON, LIMITED—
India Rubber Market Report.

13, Rood Lane, London, E. C.

September 27th, 1907.

At to-day's auction, about 426 packages of Ceylon and Malaya Plantation grown rubber were under offer, of which, only 161 were sold. The total weight amounted to nearly 21 tons. (Ceylon over $6\frac{1}{4}$ tons, and Malaya over $14\frac{1}{2}$ tons).

These small supplies again met with an irregular demand.

On the whole the quality of the offerings was a little disappointing, there being only a few parcels of fine Sheet and Biscuits, and none of the palish Crepe or Block.

Competition was generally rather restricted owing to the scarcity of orders, and prices were easier for all grades.

Fine Sheet and Biscuits marked a decline of about 1*d.* per lb. on last sale rates, while some of the lower grades were affected to a rather greater extent.

TO-DAY'S QUOTATIONS.

Sheet, etc.	
Good to Fine Sheet	4/10¼ to 4/11¾
Fine Biscuits	4/10¼ to 4/11¾
Ordinary Biscuits	4/9
Crepe.	
Fine Palish	4/6½ to 4/10¼
Palish to darkish	4/5½
Dark and Blocked	3/8½ to 4/3
Unwashed Scrap.	
Fine	3/6 to 3/7½
Fair to medium	3/— to 3/5½
Low (small lots)	1/6 to 1/8½

PLANTATION AVERAGE, AND COMPARATIVE PRICES.

Average price of Ceylon and Malaya Plantation Rubber.

To-day	161 pkgs.	4/3½
Corresponding sale last year ...	259 pkgs.	5/5¼

Plantation.		Hard Fine Para.
Fine.	Scrap.	
4/10¼ to 4/11¾	3/— to 3/7½	4/4½
5/6 to 5/7¼	3/— to 4/6	5/1½

Particulars and prices as follows:—

Ceylon.

Mark.	Pkgs.	Description.	Price.
Culloden	16	Good pressed crepe ...	4/0¾ to 4/1.
	2	Medium and dark crepe ...	3/8½ to 3/11.
Heatherley	8	Good to medium crepe pt. sold,	3/9 to 4/0¾.
Nikakotua	10	Medium to dark crepe ...	bought in.
Ingoya	6	Fine pressed sheet ...	bought in.
	1	Pressed scrap ...	bought in.
	1	Dark ,, ...	bought in.
MAK	2	Fine sheet ...	bought in.
	2	Good crepe ...	bought in.
	2	Good biscuits and scrap ...	bought in.
	1	Rejections and block ...	bought in.
	1	Heated scrap ...	1/8½.
J J V & Co.	5	Dark block ...	bought in.
Ambatenne	7	Good to fine biscuits and sheet ...	4/10¼ to 4/11¾.
	1	Rejections ...	3/6.
	5	Good to fine scrap ...	1/6 to 3/7¼.
Sorana	6	Earthy scrap part sold, ...	1/6 to 3/-.
Warriagalla	1	Good block worm ...	bought in.
	3	Dark block worm pt. sold,	2/- to 2/6.
Densworth	2	Fine biscuits ...	4/11¾.
	2	Scrap ...	1/6 to 3/6.
K	1	Good sheet ...	bought in.
	1	Good biscuits, crepe, etc. ...	bought in.
Clara	1	Fine biscuits ...	4/9.
Waharaka	1	Pressed scrap ...	3/2.
	1	Dark blocked worm ...	bought in.

Mark.	Pkgs.	Description.	Price.
Imboolpitiya	1	Scrap, etc. ...	3/-.
Doranakande	14	Scrap and rejections pt. sold,	3/6.
Ballacadua	3	Brown pressed crepe ...	bought in.
Sirigalla	4	Fine pale biscuits ...	bought in.
	1	Very fine scrap ...	bought in.
Kahagalla	1	Good worm ...	bought in.
Galatura	1	Good scrap ...	bought in.
Edengoda	1	Good scrap ...	bought in.
Wavena	1	Scrap ...	bought in.
Kumbukkan	4	Fine biscuits ...	bought in.
Verulapitiya	1	Fine sheet ...	bought in.
Marakona	1	Good sheet ...	bought in.
Kumaradola	2	Fine biscuits ...	4/11¾.
	2	Scrap & rejections ...	bought in.
Elston	1	Fine biscuits ...	4/11¾.
	1	Pressed scrap ...	bought in.
		Malaya.	
K	3	Fine crepe ...	4/6.
	3	Brown ,, ...	3/10¾.
K P Co Ld.	6	Good dark block ...	bought in.
V R Co Ld. Klang FMS	37	Good to fine crepe ...	4/5½ to 4/10¼.
	1	Pale opaque block ...	bought in.
	19	Good to medium block part sold,	3/11¾.
R S R	12	Fine sheet part sold, ...	4/11¾.
	3	Scrap ...	3/7½.
E B & Co. PIN LCY	3	Fine sheet ...	bought in.
Y L	1	Pressed sheet ...	bought in.
SPR L MUAR E Straits	26	Palish opaque block ...	bought in.
Jugra	9	Crepe & block ...	bought in.
R S&D R	10	Fine sheet ...	4/11¼.
	4	Rejections ...	3/6 to 3/6½.
MCI	3	Rough biscuits ...	bought in.
	2	Pressed crepe ...	bought in.
	2	Good scrap & rejections ...	3/5½.
C M R E Ld.	12	Good crepe ...	bought in.

Mark.	Pkgs.	Description.		Price.
Damansara	28	Good to medium crepe	...	4/6 to 4/6¾.
	10	Good to medium block	...	bought in.
	1	Sheet	...	bought in.
Yam Seng	7	Fine sheet	...	bought in.
	1	Rejections	...	bought in.
	3	Scrap	...	bought in.
F (S) R Co. Ld.	10	Good to fine sheet	...	bought in.
B R R Co. Ld.	13	Fine darkish block	...	bought in.
Merton	12	Rough sheet	...	bought in.
	1	Brown pressed crepe	...	bought in.
Sungei Krudda	19	Fine sheet	...	bought in.
	3	Good scrap	...	bought in.
Linggi	24	Fine pale crepe	...	bought in.
SSBRCoLd.	4	Fine sheet	...	bought in.
	3	Mottled crepe part sold,	...	3/11.
	1	Brown pressed crepe	...	4/3.
		Java.		
Pasir Oetjing	1	Fine sheet	...	bought in.
	1	Pale scrap	...	bought in.
Tjidjerock	1	Dark scrap	...	2/0½.

GOW, WILSON & STANTION, LIMITED—
India Rubber Market Report.

13, Rood Lane, London, E. C.

October 11*th*, 1907.

At to-day's auction, about 546 packages of Ceylon and Malaya Plantation grown rubber were under offer, of which, only 278 were sold. The total weight amounted to nearly 30½ tons. (Ceylon nearly 4 tons, and Malaya and Sumatra nearly 26½ tons).

These supplies met a decidedly better demand, orders being a good deal more plentiful than has recently been the case. Since the last auction, however, the Para market has declined about 2*d*. per lb., and Fine Plantation was in consequence also lower than at the last sale.

Competition was fairly general, and any parcels showing specially fine quality were in most cases sought after.

A very pale lot of Crepe realized 5/2, this being the highest price of the auction, while some exceptionally clean and bright lots of Sumatra Sheet and Ceylon Biscuits sold at from 4/10 to 4/10½ per lb.

There was a good enquiry for the better grades of Scrap, which were mostly sold at prices comparing very favourably with last sale rates.

TO-DAY'S QUOTATIONS.

SHEET, ETC.

Very Fine Clear Amber Sheet	4/10 to 4/10½
Good to Fine Sheet	4/8½ to 4/9¾
Very Fine Biscuits	4/10
Fine Biscuits	4/8½ to 4/9½

CREPE.

Very Fine Pale	5/2
Fine Palish	4/7 to 4/9
Good to darkish	3/11 to 4/2¾
Dark and Blocked	3/6 to 4/2¾

UNWASHED SCRAP.

Fine	3/6½ to 3/8¼
Fair to medium	3/1 to 3/5½
Low	1/11

PLANTATION AVERAGE, AND COMPARATIVE PRICES.

AVERAGE PRICE OF CEYLON AND MALAYA PLANTATION RUBBER.

To-day	278 pkgs.	4/2¼
Corresponding sale last year ..	232 pkgs.	5/1¼

Plantation.		Hard Fine Para.
Fine.	Scrap.	
4/8½ to 5/2	3/1 to 3/8¼	4/2½
5/6 to 5/8	3/9 to 4/6½	5/1½

Particulars and prices as follows:—

Ceylon.

Mark.	Pkgs.	Description.	Price.
A & B	4	Good biscuits ...	bought in.
Poonagalla	1	Fine Ceara biscuits ...	bought in.
	1	Scrap and rejected biscuits	bought in.

Mark.	Pkgs.	Description.	Price.
Siragalla	4	Fine pale biscuits ...	bought in.
	1	Fine scrap ...	bought in.
Degalessa	2	Good biscuits ...	bought in.
	1	Rejected biscuits and scrap (4 lbs.) ...	3/5¼.
Verulapitiya	1	Fine sheet ...	4/8½.
Marakona	1	,, ,, ...	4/8½.
Palli	12	Fine biscuits and sheet ...	4/8 to 4/9.
	3	Good scrap and rejections	3/1 to 3/7.
Ambatenne	2	Fine biscuits ...	4/9 to 4/9½.
	1	Good scrap ...	3/5.
Tallagalla	2	Fine biscuits ...	4/10.
	2	Good scrap ...	3/7½.
Warriapolla	4	Very fine biscuits ...	4/10.
	1	Pressed scrap ...	3/4.
K	3	Crepe, scrap and block ...	1/6 to 3/6.
C W M & Co.	4	Good biscuits ...	4/9 to 4/10.
	1	Fine Scrap ...	3/7.
Arapollakande	11	Fine biscuits ..	4/10.
	1	Fine palish crepe ...	4/7½.
	2	Good to medium dark crepe	3/10¼ to 4/0¼.
	1	Good scrap ...	3/6.
	5	Dark block ...	3/8 to 3/9.
Culloden	5	Good brownish to dark pressed crepe ...	3/11 to 4/0¼.
Kempsey	7	Good and medium dark block ...	4/0¾ to 4/2¾.
Ingoya	1	Scrap ...	1/11.
MAK	1	Block and rejections ...	1/11.

Malaya.

Mark.	Pkgs.	Description.	Price.
Highlands	52	Fine ribbed sheet ...	bought in.
B R R Co. Ld.	26	Fine darkish block ...	bought in.
	17	Good dark block ..	bought in.
	1	Good Rambong block ...	bought in.
	45	Fine ribbed sheet ...	bought in.
	1	Dark block ...	bought in.
F (S) R Co. Ld.	5	Good sheet ...	bought in.
	8	Dark block ...	bought in.
C M R E Ld.	15	Fine crepe ...	bought in.
	16	Good ,, ...	bought in.
	2	Dark ,, ...	bought in.
Beverlac	13	Fine sheet ...	bought in.
	1	Good scrap ...	bought in.

Mark.	Pkgs.	Description.	Price.
Yam Seng	7	Fine sheet ...	bought in.
	3	Good scrap ...	3/5.
Welkandalla	2	Brown crepe ...	3/9¾.
Linggi	12	Very fine pale crepe ...	bought in.
B M & Co.	14	Fine sheet ...	4/9 to 4/9½.
	1	Good Rambong ...	bought in.
	7	Good scrap and rejections	3/5½ to 3/7¼.
S K R Co. Ld.	15	Good crepe ...	4/2¾ to 4/8¾.
S K & Co.	7	Good dark block ...	3/8.
Damansara	14	Good to fine crepe ...	4/7¼ to 4/9.
	1	Fine dark sheet ...	bought in.
	6	Good and medium block ...	3/9 to 4/0¼.
B & D	11	Uncured block ...	3/6 to 3/9.
B & D	2	Blocked scrap ...	pt. sold, 3/3½.
	15	Very fine sheet ...	4/9.
	1	Good „ ...	4/6½.
	5	Rejections ...	3/6.
	2	Fine sheet ...	4/7 to 4/9.
	4	Good crepe ...	3/11.
	1	Good biscuits ...	4/9.
	1	Very fine pale crepe ...	5/2.
	1	Dark crepe ...	bought in.
	3	Good to very fine sheet and biscuits ...	4/9 to 4/10.
	4	Good biscuits and scrap ...	3/6½ to 3/8½.
	1	Rejections ...	3/6½.
	2	Fine sheet ...	4/9¾.
	1	Pressed uncured ...	bought in.
L E Muar Straits	26	Palish opaque block ...	3/8.
R R S & D	5	Fine sheet ...	4/9½.
L C Y Y L	1	Pressed sheet ...	2/8.
R S R	7	Fine sheet ...	4/9¼.
	2	Scrappy rejections ...	3/7½.
L S H S B	1	Sheet ...	bought in.
S R Co. Ld.	22	Fine sheet ...	bought in.
T C S	2	Good scrap ...	3/6¼.

Mark.	Pkgs.	Description.	Price.
V R Co., Ld. Klang F M S (in triangle)	1	Palish opaque block ...	bought in.
	16	Good and fine block ...	4/2¼.
		Sumatra.	
B S Bila	22	Fine sheet	pt. sold, 4/10 to 4/10½.
	1	Rough sheet ...	bought in.
	9	Good scrap ...	3/5½ to 3/8¼.
	3	Rejections ...	3/7¾.

GOW, WILSON & STANTON, LIMITED—
India Rubber Market Report.

13, Rood Lane, London, E. C.

October 25*th*, 1907.

At to-day's auction, about 874 packages of Ceylon and Malaya Plantation grown rubber were under offer, of which, only 351 were sold. The total weight amounted to about 45 tons. (Ceylon about 12¾ tons, and Malaya over 32¼ tons).

After the steadily improving private market lately recorded for all descriptions, a sudden setback took place yesterday, and at the sale all grades marked a decline of about *2d.* per lb. on last auction quotations. This may be chiefly attributed to the unsettled conditions in America and the latest reports of the receipts at Manaos. Orders were scarce, and a large proportion of the sale had to be withdrawn for want of competition, quotations for the lower grades being especially irregular.

A fine parcel of Lanadron block, some very pale Gikiyanakande worm and Jebong crepe were among the most attractive lots included, but these had to be withdrawn for higher limits.

There were, therefore, no quotations for quite the finest grades, the highest price of the auction being 4/8½ per lb., which was paid for some Vallambrosa crepe, some of the other parcels referred to above being limited at about 5/5 per lb.

TO-DAY'S QUOTATIONS.

Sheet, etc.	
Good to Fine Sheet	4/4 to 4/8
Very Fine Biscuits	4/8¼
Fine Biscuits	4/7¼ to 4/8

CREPE.

Fine Palish	4/6½ to 4/8½
Good to darkish	3/8 to 4/5½
Dark and Blocked	3/6 to 3/7¾

UNWASHED SCRAP.

Fine loose	3/7
Fine	3/3 to 3/6
Fair to medium	3/1
Pressed	3/1½ to 3/4

PLANTATION AVERAGE, AND COMPARATIVE PRICES.

AVERAGE PRICE OF CEYLON AND MALAYA PLANTATION RUBBER.

To-day	351 pkgs.	4/1⅜
Corresponding sale last year ...	131 pkgs.	5/2¼

Plantation.		Hard Fine Para.
Fine.	Scrap.	
4/7 to 4/8½	3/1 to 3/7	4/2½
5/6 to 5/9¾	3/9 to 4/10¾	5/3

Particulars and prices as follows :—

Ceylon.

Mark.	Pkgs.	Description.	Price.
Kumbukkan	2	Fine biscuits ...	bought in.
	1	Good scrap ...	3/5½.
	1	Good lump scrap ...	bought in.
Dangan	1	Fine biscuits ...	bought in.
	1	Good scrap ...	bought in.
Gikiyanakande	23	Fine pale worm ...	bought in.
	11	Good and medium crepe ...	3/6 to 4/1½.
Suduganga	3	Good sheet ...	bought in.
	3	Scrap ...	bought in.
	2	Rough sheet ...	bought in.
	3	Rough biscuits ...	(33 lbs.) 3/9.
	6	Barky scrap ...	bought in.
Old Haloya	1	Mixed biscuits worm and crepe ...	bought in.

Mark.	Pkgs.	Description.	Price.
Kipitiagalla	2	Dark scrap ...	bought in.
	1	Rejected sheet ...	bought in.
	6	Barky scrap ...	bought in.
K P G	6	Black crepe ...	bought in.
S G	2	Scrap ...	bought in.
A R / P C	10	Darkish to dark crepe ...	3/4$\frac{1}{4}$ to 3/6.
S	1	Black soft crepe ...	bought in.
N R	7	Good sheet ...	bought in.
	2	Sheet and pressed ...	bought in.
Glencorse	1	Fine biscuits ...	4/8.
	2	,, scrap ...	3/5$\frac{1}{4}$.
Culloden	24	Good brownish and brown pressed crepe ...	3/6 to 3/11$\frac{1}{4}$.
Ellakande	2	Brown crepe ...	3/10$\frac{1}{4}$.
	1	Black ,, ...	3/6.
Heatherley	7	Good brown and brownish to black crepe ...	3/6 to 3/11$\frac{3}{4}$.
S	3	Brownish to black crepe ...	3/10.
	1	Good biscuits ...	4/7$\frac{3}{4}$.
	1	Good scrap ...	bought in.
Ingoya	6	Fine pressed sheet ...	bought in.
	1	Blocked scrap ...	3/1$\frac{1}{4}$.
Langsland	18	Fine biscuits ...	4/7$\frac{3}{4}$ to 4/8.
	2	Sheet crepe and scrap ...	bought in.
Arapollakande	9	Fine biscuits ...	4/8$\frac{1}{4}$.
	4	Dark crepe ...	3/8$\frac{1}{4}$ to 3/9$\frac{1}{2}$.
	1	Black block ...	3/4.
Polatagama	2	,, crepe ...	bought in.
Weoya	2	Good to fine biscuits ...	bought in.
MAK	1	Rough biscuits ...	bought in.
Poonagalla	1	Fine pale biscuits ...	bought in.
M	3	Fine pale biscuits ...	bought in.
Elston	1	Good scrap ...	bought in.
Kumaradola	7	Fine biscuits ...	bought in.
Madampe	1	,, ,, ...	4/8.
Galphele	2	Good block and pressed biscuits ...	bought in.
	1	Good scrap ...	bought in.
Kahagalla	1	Fine worm ...	bought in.
Galatura	1	Good scrap ...	bought in.
Edengoda	1	,, ,, ...	bought in.

Mark.	Pkgs.	Description.	Price.
Wavena	1	Good scrap ...	bought in.
Verulapitiya	1	,, sheet ...	4/8.
	1	Scrap ...	3/-.
Glanrhos	6	Darkish and black crepe ...	pt. sold, 3/9.
	9	Good biscuits ...	bought in.
Clontarf	2	,, ,, ...	4/8$\frac{1}{4}$.
	1	Brown crepe ...	3/8$\frac{3}{4}$.
	1	Black ,, ...	bought in.
Sorana	4	Good biscuits ...	4/8.
Sorana	3	Good scrap ...	3/7.
Tallagalla	4	Good biscuits ...	4/7$\frac{3}{4}$.
	3	Good scrap ...	3/7.
	1	Rejections ...	3/5.
Doranakande	5	Good biscuits ...	4/7$\frac{1}{2}$.
	1	Rough sheet ...	4/-.
	4	Good and medium scrap ...	bought in.
	3	Rejections ...	bought in.
Waharaka	1	Scrap ...	3/4.
	2	Dark blocked worms ...	bought in.
Hylton	2	Fine biucuits ...	4/7$\frac{3}{4}$.
	1	Scrap ...	bought in.
V S	1	Good biscuits and sheet ...	4/7.
K M	1	Rough Ceara biscuits ...	4/-.
	1	Rejections ...	3/5.
	1	Scrap ...	3/5.
	3	Darks crap and pressed crepe ...	1/1 to 3/5.
	1	Good crepe ...	bought in.
	1	Good biscuits ...	4/7.
	2	Good to fine scrap ...	2/8 to 3/6.
	4	Good sheet biscuits and crepe	pt. sold, 3/- to 4/5.
Ayr	1	Good sheet ...	4/7$\frac{1}{2}$.
	1	Scrap ...	3/4.
G D J	1	Good sheet ...	4/7$\frac{1}{2}$.
	1	Fine palish biscuits ..	4/7$\frac{1}{2}$.
	1	Good scrap ...	3/4.
Densworth	2	Good biscuits ...	4/7$\frac{1}{2}$.
Taldua	2	,, ,, ...	4/7.
	1	Lump scrap ...	3/4.
Ambatenne	2	Fine biscuits ...	4/7$\frac{1}{2}$.
Sunnycroft	2	Fine sheet ...	4/7.
	1	Good scrap ...	3/6.

Malaya.

F (S) R Co. Ld.	5	Good sheet ...	bought in.
B R R Co. Ld.	25	Good & medium block ...	bought in.
	3	Dark & medium block ...	bought in.
	17	Good washed sheet ..	bought in.

Mark.	Pkgs.	Description	Price.
Terentang	18	Good & medium crepe	pt. sold, 3/6.
Batang Kali	6	Fine palish crepe	bought in.
	1	Rambong crepe	bought in.
	2	Dark ,,	bought in.
Ayer Angat	12	Fine pale crepe	bought in.
	2	Palish ,,	bought in.
	9	Good dark & brown crepe	3/6 to 3/8.
Linsum	9	Fine pale crepe	bought in.
	7	Good & medium crepe	pt. sold, 3/7¼.
C R / R W & Co. / E	2	Scrap	3/5¼.
	2	Rejections & sheet	pt. sold, 3/5.
BNS	22	Fine sheet	4/4 to 4/6½.
	4	Rejections & scrap	3/3 to 3/4¾.
G H	2	Dark crepe	bought in.
	3	Rambong block	bought in.
L	3	Good palish crepe	3/9.
	9	Dark ,, ,,	3/5 to 3/7.
N B T C & L	3	Good scrap	bought in.
V R Co Ld. Klang F M S	29	Good & medium crepe	4/8½.
	38	Good to fine block	pt. sold, 3/9¾.
K P Co Ld.	11	Palish block	bought in.
	5	Fine sheet	pt. sold, 4/7¾.
	6	Fine & medium scrap	3/4 to 3/6¾.
	6	Good dark block	bought in.
K	17	Good to fine crepe	3/7½ to 4/5½.
	1	Wet pressed crepe	bought in.
P S E	12	Fine amber sheet	4/7¾.
	1	Good dark block	bought in.
R S R	6	Fine amber sheet	4/7½ to 4/8.
	3	Rejections	bought in.
Matang	5	Dark & barky scrap	bought in.
	3	Blocked scrap	bought in.
L C Y	1	Pressed sheet	bought in.
Y L	38	Very fine pale crepe	bought in.
S P R	6	Fine pale crepe	bought in.
Jebong	24	Darkish ,,	bought in.
S S B R Co. Ld.	4	Dark pressed crepe	bought in.
	1	Palish crepe	bought in.
	5	Fine amber sheet	bought in.

Mark.	Pkgs.	Description.	Price.
J J V & Co.	5	Good scrap	bought in.
C M R E Ltd.	12	Good to fine crepe	bought in.
	19	Medium & dark crepe	bought in.
Shelford	5	Fine sheet	bought in.
	2	Dark block	bought in.
Beverlac	5	Fine sheet	bought in.
Sungei Krudda	16	Good to fine sheet	bought in.
	3	Dark pressed crepe	bought in.
	1	Good scrap	3/4¾.
Linggi Plants	13	Fine pale crepe	bought in.
	4	Good crepe	bought in.
	4	Fine palish pressed crepe	bought in.
	8	Dark crepe	3/7.
L E Muar Straits	55	Fine block	bought in.
	31	Palish opaque block	bought in.
R L R	6	Good sheet	4/7¾.
	1	Good crepe	4/3.
S L R	7	Good scrap	3/4¼.
R R S & D	10	Fine sheet	4/7¾.
M	1	Thick rejections	3/4.
	1	Dark scrap	3/4.
McI	1	Dark scrap	4/9.
S K R Co Ld.	14	Good to fine crepe	pt. sold, 4/7.
	4	Good & medium block	bought in.
E K K P	3	Fine sheet	4/7¾.
	1	Rejections	bought in.

Penang.

Abstract of Meteorological Readings in the Criminal Prison Observatory for the month of October, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Mean Maximum.	Mean Minimum.	Mean Range.	Mean Wet Bulb.	Mean Vapour Tension.	Mean Dew Point.	Mean Humidity.			
	Ins.	°F	°F	°F	°F	°F	°F	°F	°F	%		Ins.	Ins.
Criminal Prison Observatory, Penang ...	29·898	147·8	79·1	88·1	73·3	14·7	76·5	·854	74·7	81	S. E.	12·63	4·25

Colonial Surgeon's Office,
Penang, 11*th November*, 1907.

M. E. SCRIVEN,
Assistant Surgeon.

R. DANE,
Acting Colonial Surgeon, Penang.

Selangor.

Abstract of Meteorological Readings in the various Districts of the State for the month of September, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature. Mean Dry Bulb.	Temperature. Maximum.	Temperature. Minimum.	Temperature. Range.	Hygrometer. Mean Wet Bulb.	Hygrometer. Vapour Tension	Hygrometer. Dew Point.	Hygrometer. Humidity.	Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
	Ins.	°F	°F	°F	°F	°F	°F	°F	°F	%		Ins.	Ins.
General Hospital, Kuala Lumpur	29·822	147·8	80·7	90·7	70·9	19·8	76·5	0·833	73·7	79	S.W.	6·69	1·26
Pudoh Gaol Hospital ,, ...	...	...	...	...	...	...	...	...	...	...	...	6·39	1·77
District Hospital ,, ...	...	...	...	...	...	...	...	...	...	...	...	8·16	1·40
,, Klang	...	...	...	88·4	70·6	17·8	...	...	...	...	...	10·51	3·15
,, Kuala Langat	...	...	...	...	...	...	...	...	...	...	...	7·87	2·07
,, Kajang	...	...	...	87·2	76·1	11·0	...	...	...	...	...	2·94	0·71
,, Kuala Selangor	...	...	...	88·2	77·4	10·8	...	...	...	...	...	2·50	0·65
,, Kuala Kubu	...	...	...	...	...	...	...	...	...	...	...	10·76	3·35
,, Serendah	...	...	...	...	...	...	...	...	...	...	...	4·53	0·77
,, Rawang	...	...	...	91·1	71·1	20·0	...	...	...	...	...	4·31	1·35
Beri-beri Hospital, Jeram	...	...	...	...	...	...	...	...	...	...	...	3·56	1·54
Sabah Bernam	...	...	...	...	...	...	...	...	...	...	..	4·16	1·52

STATE SURGEON'S OFFICE,
KUALA LUMPUR, *4th November*, 1907.

A. J. McCLOSKY,
Acting State Surgeon, Selangor.

Perak.

Abstract of Meteorological Readings in the various Districts of the State for the month of September, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Taiping .	...	154	82·57	95	69	26	77·45	873	...	78	...	6·69	1·24
Kuala Kangsar ...	...	...	81·25	95	68	27	74·71	774	...	72	...	1·93	·48
Batu Gajah ...	...	156	81·69	93	70	23	77·24	874	...	81	...	6·03	2·16
Gopeng ...	...	...	81·70	94	62	32	76·29	831	...	77	...	5·32	1·32
Ipoh ...	.	...	81·85	93	74	19	76·77	851	...	78	...	2·39	·65
Kampar ...	...	...	81·78	94	69	25	75·58	802	...	74	..	4·14	1·59
Teluk Anson ...	...	...	82·06	93	68	25	78·97	946	...	87	...	4·72	2·34
Tapah ...	...	...	81·64	94	65	29	74·59	761	...	71	...	5·28	1·90
Parit Buntar ...	...	...	82·52	92	71	21	76·94	852	...	77	...	3·07	·92
Bagan Serai ...	...	...	82·14	92	71	21	77·04	861	...	79	...	4·28	1·83
Selama ...	...	...	81·47	92	70	22	76·64	853	...	80	...	7·88	3·03

STATE SURGEON'S OFFICE,
TAIPING, 19*th October*, 1907.

M. J. WRIGHT,
State Surgeon, Perak.

Pahang.

Abstract of Meteorological Readings in the various Districts of the State for the month of September, 1907.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature. Mean Dry Bulb.	Temperature. Maximum.	Temperature. Minimum.	Temperature. Range.	Hygrometer. Mean Wet Bulb.	Hygrometer. Vapour Tension.	Hygrometer. Dew Point.	Hygrometer. Humidity.	Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
	Ins.	°F	°F	°F	°F	°F	°F	°F	°F	%		Ins.	Ins.
Kuala Lipis ...	...	...	...	93·0	67	15·03	73·5	...	...	...	...	8·30	2·67
Raub ...	...	...	...	92·0	68	18·76	73·5	...	...	...	...	5·67	1·64
Bukit Fraser ...	...	...	...	...	...		...	...	...	...	...	4·46	1·48
Bentong ...	...	...	...	95·0	66	20·86	74·7	...	...	...	...	5·54	1·13
Temerloh ...	...	...	...	94·0	70	18·40	...	...	...	...	...	10·37	2·06
Pekan ...	...	...	...	89·0	70	11·80	74·2	...	...	...	...	9·69	2·46
Kuantan ...	...	...	...	93·0	61	21·83	76·9	...	...	...	...	6·99	2·10
Sungei Lembing ...	...	...	...	85·1	68	16·08	...	...	...	...	...	6·58	1·24

From July 15th until September 11th was a period of unprecedented drought in Ulu Pahang.

STATE SURGEON'S OFFICE,

RAUB, *23rd October*, 1907.

W. H. FRY,

State Surgeon, Pahang.

The Duff Development Company, Limited, Kelantan.

Abstract of Meteorological Readings for the month of September, 1907.

District.	Temperature.			Rainfall.	
	Maximum.	Minimum.	Range.	Total Rainfall.	Greatest Rainfall during 24 hours.
	Mean. °F	Mean. °F	Mean. °F	Inches.	Inches.
Kuala Lebir ...	88·2	71·6	16·6	13·70	2·20
Taku Plantation ...	...	...	...	13·77	2·91

SURGEON'S OFFICE,

KUALA LEBIR, 11*th October*, 1907.

JOHN D. GIMLETTE,

Surgeon.

AGRICULTURAL BULLETIN

OF THE

STRAITS

AND

FEDERATED MALAY STATES.

No. 12.] DECEMBER, 1907. [Vol. VI.

SOME NOTES ON THE ACCLIMATIZATION OF PLANTS.

When a country is occupied by man for the first time a great alteration in the Flora commences. As the forests are gradually cleared for cultivation, a large number of plants are introduced either for use or ornament intentionally, or accidentally as weeds. In an island like Singapore where cultivation has been going on for eighty-four years, and in Penang where it has been going on still longer a very large number of exotic plants have been introduced from time to time. Many perhaps most of these have failed to establish themselves as regular inhabitants of the country, while others have successfully done so and formed part of the present day flora. By *establishing themselves* is intended not only growing readily, but flowering and fruiting regularly and reproducing themselves as freely as any local indigenous plant. The greater part of the whole of the Malay Peninsular region, was originally densely afforested, the greater number of the plants being arboreous. The number of herbaceous plants in the forests being small, especially in the lowland country. Herbaceous plants in a dense forest have not much chance of getting a sufficiency of light owing to the density of the leaf canopy of the forest trees overhead. Many herbaceous plants, however, grow as epiphytes on the higher branches and in this way obtain more light. The consequence of this forest growth with the strong competition for light, is that the percentage of herbs to trees and shrubs, including climbing shrubs is very small. In the Penang flora exclusive of ferns out of about 1,800 phanerogamous plants over 1,300 are trees and shrubs, 410 are herbs, about 70 epiphytes and 12 parasites. The greater number of the indigenous herbaceous plants are natives of the sea-shores and of sandy spots formerly river beds, where an extensive arboreous vegetation cannot grow. But besides these wherever the country has been opened up round villages and along roadsides and in open spots generally, we find a great number of

herbaceous plants and half-woody shrubs, which there is reason to believe have been introduced from various parts of the world and which have thoroughly established themselves. These plants are commonly known as *weeds* and in many cases their place of origin is entirely unknown, and can only be guessed at, from the known habitats of allied species which have not succeeded in establishing themselves. In the large orders *Compositæ* and *Gramineæ* the greater part of the species here are undoubtedly introduced.

The *Compositæ* in the Malay Peninsula which are thoroughly established or indigenous number about 40, of these one tree, two shrubs and three or four herbs are undoubtedly indigenous. The remainder are almost certainly introduced, only occurring in cultivated ground. In grasses the number of really indigenous species is also small compared with the number of recorded species, and these are nearly all sea-shore plants or inhabitants of the sandy wastes of the old river beds. The grasses which form the turf of the gardens and fields, are almost all exotics, such as *Paspalum conjugatum* or sea-shore plants, *Zoysia* and *Ischoemum muticum.*

The greater part of these weeds occur all over the tropics now and follow man wherever he goes, and it is most probable that all were originally natives of sea-shores in other parts of the world. They acclimatize themselves readily in almost any cultivated ground throughout the tropics.

Besides these accidentally introduced weeds, a very large number of useful or ornamental plants have been introduced intentionally by man at various dates, and plants from all parts of the world have been introduced into the Botanic Gardens by way of experiment, and some notes on the acclimatization of these may be of some interest.

The adaptability of plants to abnormal surroundings varies very much. One would not expect xerophilous, dry country desert plants or plants from cold countries to acclimatize or even to go on growing in a hot wet equatorial region, at the same time occasionally plants from such places thrive in a very unexpected manner. To begin with plants from exceptional habitats such as the sea-shore, sand or mud to the stiff dry clay of the inland region.

Scoevola koenigii.—A sea-shore shrub, is never found wild except on the actual sand of the sea-shore. Plants transferred to the Botanic Gardens thrive well, flower and fruit, growing in stiff clay.

Crinum asiaticum.—A sea sand, and rock plant grows readily, and reproduces itself freely in all parts of the garden, both in full sun and in shade. Plants grown in shade are very robust, and flower and fruit well. As its seeds are large and adapted for sea-dispersal they generally germinate close to the plant where they fall, and most thus perish. The seed seems to possess a very great amount of vitality. Two seeds were fastened to a card in August,

1905, and put away in a drawer for a year and in September, 1906, were found to have germinated and produced a perfectly healthy green shoot.

Few of the other species of the genus have set seeds, even the pasture land *C. defixum* seems to fruit very seldom. *C. northianum*, a tidal mud species from Sarawak fruits successfully, but none of the other species have ever set fruit.

The tidal mud climber, *Tristellateia australasica*, is cultivated in all gardens, and flowers and fruits easily. Though never seen wild except in salt mud, it is a much more free flowerer in the dry clay soil of the gardens. It grows readily from seed but has never spread.

Casuarina equisetifolia is a sea-shore tree which has the peculiar habit of growing in a single line on sandy beaches just above the loose sand where the ground is firmer. It is not uncommon to see a line of these trees some distance from the sea where the sea has receded, the line of trees marking out the former edge of the sea beach. Planted inland in swampy ground it grows to a fair size, but usually never flowers. In drier soil it often flowers and fruits profusely but does not spread of itself.

C. sumatrana which inhabits rocky and sandy spots close to the sea and tidal river in Borneo grows well in the stiff clay of the Botanic Gardens, fruiting regularly, but quite old trees have still retained the cone-shaped form of the young plant, and show no signs of taking on the characteristic adult form resembling a Scotch Fir with a tall straight stem and small rounded crown.

Flagellaria indica is a sea-shore plant, which grows very strongly and rapidly in the gardens especially however in damp spots by the lake. It flowers and fruits abundantly and has spread itself to some distance across the gardens.

Acrostichum aureum, typically a tidal mud fern, when isolated by the silting up of the tidal river by which it grows, remains for a long time, but does not apparently spread. A large clump grows in the Economic Gardens, on ground formerly a tidal river bed, as Nipa fruits have been found in it, but there is nothing to show that there has been a tidal river here since the founding of Singapore. It shows no sign of spreading.

I have also seen *Pluchea indica*, a tidal mud plant far inland and far away from any river in Tanglin, but it has not spread and I have failed to cultivate it at Tanglin.

These tidal mud plants often persist long after the locality has ceased to be near a river or the sea, but they fail to propagate themselves.

Most of our mountain plants fail to accommodate themselves to the low country and perish soon after being brought down, curiously the *Conifers*, *Dammara*, *Dacrydium* and *Podocarpus Cupressinus*, although never seen below 2,000 feet elevation do very well in the Botanic Gardens. The first has flowered more

than once, the other two flower and fruit fairly frequently, though they can hardly be said to spread. *Podocarpus Cupressinus* is a much finer plant in the Botanic Gardens than I have ever seen it wild.

Mountain and Sea-shore Plants.

It is well known that in many parts of the world plants are found growing wild on the sea-shore, and at high altitudes in the mountains and nowhere between. Thus we find *Bæckea frutescens* on Mount Ophir and other mountains at an altitude of 4,000 feet, but it is also to be found growing close to the sea on rocks in North Borneo and Tringganu. *Dischidia Rafflesiana*, a common epiphyte on the trees near the sea, is again to be met with on Mount Ophir at a high elevation, though absent from the intermediate region. *Bæckea frutescens* has been successfully cultivated on Penang Hill at about 2,000 feet altitude, but speedily perishes in Singapore.

The reasons for such plants occurring on the sea-shore and on the tops of mountains only is not clear. It is obviously not a mere question of distribution of species as these plants cannot be induced frequently to grow when moved away from the sea inland. It may be due to other atmospheric changes.

It is interesting too to note that many mountain plants which are found commonly growing at considerable altitudes (at 4,000 feet or upwards) on rocks or low trees can only be induced to grow in the low country on the tops of lofty trees, and not rarely occur there in a wild state. Thus, *Coelogyne Cumingi* which grows in great masses on bare rock faces on Mount Ophir, in the low country occurs on the upper branches of lofty trees 150 feet tall, and is very difficult to induce to thrive and flower under any circumstances at sea level, even on the top of Bukit Timah Hill in Singapore 500 feet altitude.

Lecanopteris carnosa, a peculiar fern, grows on lofty Shorea trees about 150 feet tall, and also it occurs abundantly on the Thaiping Hills at 4,000 feet and upwards. With this plant on Bukit Timah grows also *Rhododendron Lampongum*, the only species of *Rhododendron* occurring at less than 2,000 feet elevation. *Coelogyne Cumingi* and *Polypodium stenophyllum* all plants of typically high elevations, and all difficult plants to cultivate at the foot of the hill. *Davallia triphylla* which also occurs abundantly on the upper branches of these lofty trees, is somewhat peculiar in its habits. It was long considered an extremely rare plant, so much so that fifteen years ago very few herbaria contained dried specimens of it. By searching for fallen trees and boughs in the forests, plenty of specimens were obtained, its rarity being due to its extremely lofty and inaccessible habitat. Plants taken from fallen boughs were planted on pieces of tree fern, trunk and rough-barked wood, and found to grow luxuriantly at the low elevation of the Gardens, and it has there been established on trees only a few feet from the ground, yet this plant is never found in a wild state except on the top boughs of these lofty trees.

Many cultivated plants thrive a short way from the sea which do not thrive a little way inland. It is often said both in the old and new world that Coconuts cannot be grown successfully 20 miles inland. This is not literally true, but it not often that Coconuts are to be seen any very great distance from the sea, or tidal waters. It is often said too that Nutmegs must smell the sea, and Clove trees must see it and certainly these plants depend greatly on the proximity of the sea, and seem to require sea-breezes in order for them to thrive. It is clear that this is not a question of soil only, nor dryness of atmosphere, although these plants are particular apparently on these points.

Coconuts preter sandy soil, and dry soil, but are often grown satisfactorily on clayey soil with very little sand. Coconuts grown in damp alluvial black river soil often grow to a full size and though apparently healthy never flower or fruit, and curiously are in such a case never attacked by coconut beetles. In a large Coconut estate at Telok Kurau, in Singapore, there was a patch of wet ground, all the trees round this patch were fine and heavily fruiting trees, but those on this patch though equally good looking trees showed no signs of flowering nor apparently had they ever done so. When they died naturally, they were found never to have been touched by beetles to which the surrounding trees were liable. On a damp spot along the Bukit Timah Road were a large number of Coconut trees, of these a few in the drier spots fruited, but usually poorly, and in the damper spots not at all. These trees too were seldom if ever hurt by beetles which were abundant in the vicinity. Recently the land was opened up, and more or less drained, apparently for building sites, I now observe that a considerable number of the trees are showing signs of attack by red beetles.

How far the soil, dryness, and atmospheric conditions respectively affect certain plants is not always easy to diagnose, and different plants of the same species are certainly affected differently by their surroundings.

The Oleander grows and flowers well in Singapore town near the sea and also on high and dry hills like the hill of the Lunatic Asylum. It however was not amenable to cultivation in the Botanic Gardens, refusing to flower and gradually dying away till two plants, one red and one white were received from Manila. To all visible appearance they were exactly like the ones grown in Singapore town successfully but which failed in the Botanic Gardens. The white one flowered but eventually died away, the red one on the other hand grew and flowered constantly and cuttings from it did equally well.

The differences in dryness of atmosphere between Malacca and Singapore are by no means great, though the former is said to be dryer, yet several plants thrive in Malacca which are by no means as successful in Singapore, such are *Zizyphus jujuba*, which fruits there regularly but has, I think, never even flowered in Singapore. *Mimusops Kauki* of which big and handsome trees occur in

Malacca, but has failed to grow at all in Singapore. *Aegle marmelos* fruits there constantly but fails here. The Cola-nut (Cola vera) has flowered in the Botanic Gardens, but has grown poorly and never fruited. Trees in Johore Bahru and Batu Pahat, have flowered and fruited heavily. Though the soil appears similar and there does not seem to be any climatic difference, I have never heard of its being successful in any other part of the Peninsula.

(*To be continued.*)

HANDY METHOD OF MEASURING GIRTH OF TREES.

Those who have to spend time in taking measurements of the girth of rubber and other trees will find the following method considerably shorten their labours.

Take a piece of strong, tough paper or highly glazed calico one or one and a half inches wide and measure it out into inches and feet.

I have found the prepared tracing paper or cloth used in plan making very good for this purpose.

Begin the measurement a little way from the end of the tape and through the one inch line put a strong large drawing pin folding the rest of the tape over and if necessary stitching it to keep the flat head of the drawing pin in place.

The measuring tape is now ready for use and if the girth of trees are to be measured the procedure is as follows :—

Place the measuring tape round the tree overlapping it and press the drawing pin into the tape where it crosses again. This will leave a clean round hole in the tape the length of which can either be recorded at the time or else if an average is required the tape can be taken home and the number of holes at different distances recorded.

The smallness of the diameter of the pin, about 1/40th of an inch reduces the possibility of two measurements falling into one hole to a minimum I have found that even when many hundred readings are taken all the holes can be deciphered.

J. B. CARRUTHERS.

THE NEW PATENT DUCHEMIN FIBRE MACHINES.

From time to time attention is directed to the great possibilities of our fibre yielding plants such as Ramie, Mauritius Hemp, Sisal Pine-apple, Bananas etc., the great drawback hitherto experienced

in the successful exploitation of this industry has been the want of a cheap and reliable machine for extracting the fibre. This want appears to be at last satisfactorily settled by the invention of M. DUCHEMIN who has had many years' experience in Indo-China as President of the Chamber of Agriculture in Tonkin and who appears to have successfully overcome this difficulty.

The following notice of a Public Exhibition of his machine in full working which took place in the Botanical Gardens in Buitenzorg is quoted from the *Straits Times*, 9th May, 1907. "M. DUCHEMIN, the owner and inventor exhibited his machines in full working, in the Botanical Gardens in Buitenzorg, before an audience of interested spectators; among whom were the Head Botanist, Mr. H. J. WIGMAN; his assistant Mr. J. H. HEYL; the Head of the Agricultural College Mr. J. PIT; Inspector of the Coffee Department W. C. J. VERSLUYS, Dr. KLOOS, the French Consul and others. All expressed themselves entirely satisfied with the result of the experiments. M. DUCHEMIN has since exhibited his machine at Salatiga, before experts, with the same success; wild pine-apples and pisang stems, were satisfactorily stripped before the audience. The exhibition is to be repeated at the invitation of the Chamber of Commerce, in their building in Semarang, where the members of the Planters Society, Semarang-Kedœ, will also be present. The following is a specification of the portable 'Duchemin' Fibre Tools. (Patented) with prices."

All Semi-tropical and Tropical Countries possess in considerable quantities plants useful and workable for Fibre or Pulp—the various species of Lilies, Sansevieres, Bananas etc., growing very large in their natural wild state.

It has been conclusively proved that these plants would give a very handsome profit were there some cheap, practical and effective means of working same by the aid of native labour on the spot.

The Patentee of these Machines—M. DUCHEMIN, guided by his many years' experience in Indo-China and during his official residence as President of the Chamber of Agriculture in Tonkin, has successfully overcome this difficulty; these Machines being both portable and eminently practical enabling a small family of natives to move easily from place to place and entirely obviating the great expense and, in many cases, the unsurmountable difficulty of establishing a fixed Engineering Works in the Forests.

Specification of each of the tools is given in annexed Circular.

Various official trials having been made in Paris, at the Department of the Minister of Agriculture, Professor RINGELMANN, in an address most favourably reports as under:—

"In conclusion, the Défibreur DUCHEMIN is an instrument to be much recommended in the Colonies for the extraction of various fibres of diverse plants and a most useful tool for native workmen."

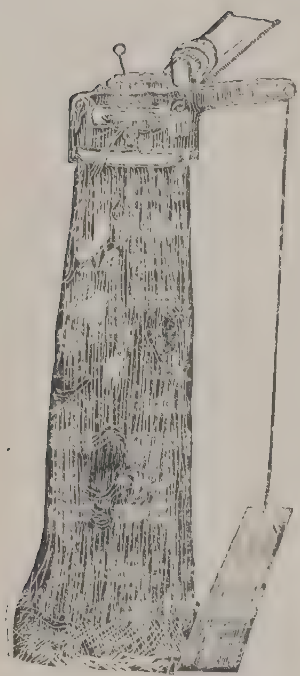
Specification.

of the

PORTABLE "DUCHEMIN" FIBRE TOOLS.

(*Patented.*)

I.—Defibreur.



The Drawing shows this Tool fixed to the trunk of a small tree and ready for use.

Made in bronze or steel, with interchangeable knives, the workman inserts the leaves to be defibred by means of the horizontal guide, regulating the pressure by the pedal, then pulling the leaves towards him all pulp is exuded leaving the fibres clear and ready for drying.

This Tool is eight inches high and fourteen inches long, weight only 6 lbs.

By attaching new knives when required, the Machine will last an indefinite time.

The Dèfibreur can readily be fixed either by inserting into a notch cut across a small sapling as shown in illustration, or fixed to a log driven into the ground or attached by two screw-bolts to a stout plank forming part of a bench.

The two screw-bolts and a coil of wire are supplied *free* with each Machine.

The method of working the *Dèfibreur* is as follows:—The workman presses upon the pedal and then inserts a few inches of the leaves of the plant to be treated, releases the pedal, rolls the ends of the leaves upon a small wooden peg and pulls steadily towards him—in a few seconds he has a hundfull of clear white fibres free from all pulp. Same is laid aside lengthways to dry and the process repeated.

Defibreur No. 2—This is another Model for working without the use of pedal.

II.—The Découpeur.

Previous to working the leaves of the Lilies they must be cut in strips of ½ inch wide, and the trunks of the Bananas into lengths about ¾ inch wide. In order that the dèfibrage may be effectual.

it is important that the strips of leaves are cut perfectly straight, otherwise the threads when worked in the *Dèfibreur* clog and turn out irregularly.

It being impossible to cut the leaves "true" by hand the *Découpeur* supplies the necessary Tool. Same is fixed similarly to the Dèfibreur, has three small interchangeable steel knives, weighs about 6 lbs. and is sufficient to work three Dèfibreurs.

III.—Ecraseur.

To facilitate the quick working of the Dèfibreur it is better to crush the thick leaves of Sansevieres, Pine-apples, and the cut lengths of Lilies. This operation could be performed by hand with a mallet, but same is uneven and very tedious to the workers, besides being unprofitable to the employer.

M. DUCHEMIN has succeeded in giving by this portable crusher most satisfactory results. Weight about 22 lbs. One Machine is sufficient to work three Dèfibreurs and is fixed as above.

IV.—Dépulpeur.

The lengths of Bananas should not be crushed as it depreciates the fibre, but it being necessary to remove some of the superfluous pulp this Tool readily denudes the surplus sap (which being very nourishing forms a valuable article of food for different animals) and enables the workman to dèfibre with ease and rapidity. The Tool is fixed in the same manner and is sufficient for three Dèfibreurs. Weight about $2\frac{1}{4}$ lbs.

Further details as to prices, shipment, etc., will readily be supplied on application to:—

F. DAZY, & Co., 20, Paper Street, London, E. C.

THE ROYAL HORTICULTURAL SOCIETY,

Vincent Sq., Westminster, S. W.

Secretary :—REV. W. WILKS, M. A.

1908.

EXHIBITIONS OF

Colonial Grown Fruit and Vegetables

(Both Fresh and Preserved.)

March 5th and 6th.
June 11th and 12th.
November 26th and 27th.

COLONIAL-GROWN FRUIT AND VEGETABLES

(Both Fresh and Preserved.)

THREE SHOWS WILL BE HELD IN 1908.

On Thursday and Friday, March 5th and 6th.
" " " " June 11th and 12th.
" " " " November 26th and 27th.

The President and Council of the Royal Horticultural Society have again arranged to hold Exhibitions of Colonial-Grown Fruits and Vegetables on the above dates.

In fixing such dates the object aimed at is to suit the season which is most likely to find the produce of the Cape and India; of Australia, Tasmania and New Zealand; and of Canada, British Columbia, and the West Indies; in the greatest perfection in London. Opportunity is afforded for each Colony to make Collective Exhibits in addition to the exhibits of individual growers or firms.

These Exhibitions were originally organized in 1904, and have been the means of bringing before the British Fruit Merchants and fruit-consuming public the wonderful resources of the British Fruit Markets quite independently of the foreigner. The Society's sole object is the advancement of the interest of the Colonies (*a*) by stimulating the production of better fruits, (*b*) by giving advice and assistance in the difficulties ever confronting Fruit-Growers, and (*c*) by helping to inform the home market. The results have been encouraging, for even in so short a time as the last three years a distinctly better quality of fruit has been sent, those recently shown being of an improved appearance, less blotched by Fungus, scale and other defects, and better packed. At the same time the Council are disappointed at the lack of Exhibitors and the smallness of their exhibits. Fruit-Growers in the Colonies are therefore asked to assist their own future competition in the market by competing in the present Exhibitions, invitations to which will be sent to the Colonial and Government Offices, the Embassies, the leading London Fruit Merchants, Colonials on furlough, and many others.

The Agents-General and other authorities are most kindly rendering every assistance, and we trust that both growers and shippers will do their best to send in Exhibits worthy of our Colonies, and to show what can be produced for the Home markets. No entrance fee or charge for space is made and Tabling is also provided free of expense. If desired any produce may be consigned direct to the Society and it will be stored in the cellars at Vincent Square and staged by the Society's officials, but the Society cannot undertake to repack and return any exhibits.

In order to allow intending Exhibitors and others time to make their arrangements, the Council have ordered the subjoined advance Schedule to be issued. The Secretary of the R. H. S., Vincent Square, Westminster, will be pleased to furnish them with any further information and to forward Entry Forms and Schedule.

The judging will take place at 11 a.m. on the first day of each Show, unless otherwise notified to the Exhibitors.

The hours of opening will be 1 p.m. on the first day and 10 a.m. on the second day.

Lectures on the Colonial Fruit Industry will be given on the first day of each Show.

The Shows will remain open until 6 p.m. on all the dates announced.

The price of admission to the public will be 2/6 on the first day, and 1/- on the second day.

Medals and other Prizes are offered by the Council in each class.

Staging must be completed by 10.30 a.m. on the first day of the Exhibition.

If the above shows are well supported by the Colonies concerned, three further exhibitions will be held in 1909, on or about March 11th and 12th, June 10th and 11th, and November 25th and 26th.

Shows of Colonial-Grown Fruits and Vegetables, 1908.

The following Schedule will apply (as far as possible) to Shows of Colonial Fruit and Vegetable Produce :—

Division I.—Colonial-Grown Fruits and Vegetables.

Awards will be made in Classes 2—24 only when staged separately from Class 1, and not when included in it.

The Colony in which the Fruit has been grown must in all cases be stated.

Class.

1.—Collection of Fruit and Vegetables.
Medals or other Prizes at the discretion of the Council.

2.—Collection of Apples (Dessert).
Medals or other Prizes at the discretion of the Council.

3.—Collection of Apples (Cooking).
Medals or other Prizes at the discretion of the Council.

4.—Collection of Pears.
Medals or other Prizes at the discretion of the Council.

5.—Pine-Apples.
Medals or other Prizes at the discretion of the Council.

6.—Bananas.
Medals or other Prizes at the discretion of the Council.

7.—Mangos.
Medals or other Prizes at the discretion of the Council.

8.—Grapes.
Medals or other Prizes at the discretion of the Council.

9.—Oranges.
Medals or other Prizes at the discretion of the Council.

10.—Limes and Lemons.
Medals or other Prizes at the discretion of the Council.

11.—Shaddocks, Pomelos and other like Fruits.
Medals or other Prizes at the discretion of the Council.

12.—Peaches and Nectarines.
Medals or other Prizes at the discretion of the Council.

13.—Plums.
Medals or other Prizes at the discretion of the Council.

14.—Melons.
Medals or other Prizes at the discretion of the Council.

15—Tomatos.
Medals or other Prizes at the discretion of the Council.

16.—Nuts.
Medals or other Prizes at the discretion of the Council.

17.—Yams, Sweet Potatos, and other Tubers.
Medals or other Prizes at the discretion of the Council.

18.—Vegetables other than Tubers.
Medals or other Prizes at the discretion of the Council.

19.—Any other Colonial-Grown Fruits or Vegetables.
Medals or other Prizes at the discretion of the Council.

DIVISION II.—COLONIAL-GROWN PRESERVED FRUITS, JAMS, ETC.

Dried or preserved Fruits of any sort or kind may be shown, subject to the condition of their being tasted by the Judges, and of their having been grown in a British Colony.

20.—Colonial-Grown and Bottled Fruits in clear glass bottles. This exhibit must not occupy a space greater than 8 feet by 6 feet, and must not be built up more than 2 feet high in the centre. All alike must be Colonial-grown and Colonial prepared.

Medals or other Prizes at the discretion of the Council.

21.—Colonial-Grown and Tinned Fruits. This exhibit must not occupy a space greater than 8 feet by 6 feet, and must not be built up more than 2 feet high in the centre. All alike must be Colonial-grown and Colonial prepared.

Medals or other Prizes at the discretion of the Council.

22.—Colonial-Grown and Dried Fruits. This exhibit must not occupy a space greater than 8 feet by 6 feet, and must not be built up more than 2 feet high in the centre. All alike must be Colonial-grown and Colonial prepared.

Medals or other Prizes at the discretion of the Council.

23.—Colonial-Grown and Preserved Vegetables. (Either Bottled, Tinned or Dried). This exhibit must not occupy a space greater than 8 feet by 6 feet, and must not be built up more than 2 feet high in the centre. All alike must be Colonial-grown and Colonial prepared.

Medals or other Prizes at the discretion of the Council.

24.—Colonial-Grown Fruits made into Jam, Jelly, Syrup, etc., in the Colony, and shown in clear glass bottles. All must alike be Colonial-grown and Colonial prepared.

The Editor will be glad to render any assistance, or give further information.

The entries close a week before the show in each case.

NOTE.

With reference to Mr. RIDLEY'S paper on local grasses for paper-making, in which he mentions Citronella grass as being probably useful for this purpose. I am informed by Mr. TYLER, the Government Printer, that he has sent home parcels of this grass, and after exhaustive trials by English and Scotch paper-makers, it has been reported as useless for paper-making.

GOW, WILSON & STANTON, LIMITED—
India Rubber Market Report.

13, Rood Lane, London, E.C.
November 22nd, 1907.

The market continues in a very uncertain condition, Fine Plantation, in sympathy with other kinds, being about 7*d*. per lb. lower where sales were effected, compared with last sale quotations.

The highest price of the sale, *viz*., 3/10, was realised for two small lots of biscuits from Hattangalla and Warriapolla. 3/9 was the highest price obtained in the room for Crepe, the finest parcels of this and Block being held for about 4/1 per lb.

It is worthy of note that no such prices as these have been seen for Plantation Rubber since 1902, while the price of Hard Fine Para is lower than it has been since February, 1903.

Scrap, unlike the finer grades, did not show such a depressed market, although here also sales were only effected with difficulty at comparatively low prices, and the darker grades of Crepe and Block were mostly withdrawn for want of support.

Number of Packages Advertised.		Quantity in Tons.			Average Price of Plantation Rubber.		Comparative Prices.		
		Ceylon.	Malaya.	Totals.	No. of Pkgs. Sold.	Price.	Hard Fine Para.	Plantation. Fine.	Plantation. Scrap.
To-day ...	619	7	$23\frac{1}{2}$	$30\frac{1}{2}$	90	$3/1\frac{3}{8}$	$3/4\frac{1}{2}$	3/8 to 3/10	2/2 to $2/8\frac{1}{2}$
Corresponding sale last year ...	446	$6\frac{1}{4}$	$20\frac{1}{2}$	$26\frac{3}{4}$	301	$5/2\frac{3}{4}$	5/2	5/7 to $5/9\frac{1}{4}$	3/4 to 4/6

TO-DAY'S QUOTATIONS.

SHEET, ETC.

Fine Block	None sold
Good to Fine Sheet	3/8 to 3/9
Very Fine Biscuits	3/9½ to 3/10
Good to Fine Biscuits...	3/6 to 3/9

CREPE.

Very Pale	None sold
Fine Palish	3/8½ to 3/9
Good to Darkish	2/9 to 3/-
Dark and Blocked	2/2

UNWASHED SCRAP.

Good	2/6½ to 2/8½
Low and Barky	1/9 to 2/2

Particulars and prices as follows:—

CEYLON.

MARK.	PKGS.	DESCRIPTION.	PRICE.
Kepitagalla	8	Pressed Scrap ...	bought in.
	1	Cuttings ...	bought in.
Suduganga	10	Scrap ...	bought in.
S G	2	" ...	bought in.
BNS	2	" ...	bought in.
	1	Rough sheet, etc. ...	1/6.
K P G	6	Dark pressed crepe ...	6d.
Elston	1	Good biscuits ...	bought in
	1	Rejections ...	1/10.
Pandamaran	5	Dark block ...	bought in.
	6	Dark crepe ...	bought in.
Kempsey	2	Dark block ...	bought in.
Ellakande	2	Brown crepe ...	3/-.
Culloden	23	Brownish to dark crepe ...	2/9 to 3/0½.
	1	Dark block ...	bought in.
	1	Black crepe ...	bought in.
Heatherley	4	Good darkish to black crepe	part sold, 2/11¼ to 2/11¾.
Hattangalla	2	Fine biscuits ...	3/10.
	2	Brown crepe ...	bought in.

Mark.	Pkgs.	Description.	Price.
Warriapolla	4	Fine biscuits	3/9½ to 3/10.
	1	Dark pressed scrap	bought in.
Sunnycroft	1	Sheet	bought in.
Doranakande	3	Good biscuits	3/6.
	7	Pressed scrap and rejections	bought in.
Tallagalla	4	Fine biscuits	3/8.
	2	Pressed crepe	bought in.
MAK	9	Good biscuits	bought in.
	1	Fine sheet	3/8½.
	9	Good scrap and rejections	part sold, 1/10.
	2	Good biscuits and crepe	bought in.
Taldua	2	Good biscuits	bought in.
	2	Fine scrap	2/8½.
	2	Dark scrap and rejections	pt. sold, 2/-.
V S	2	Good biscuits	bought in.
KM	5	Scrap	bought in.
Clara	1	Scrap and rejections	bought in.
Densworth	1	Good scrap	bought in.
Ambatenne	1	,, ,,	2/6½.
Northumberland	2	Ball scrap and rejections	pt. sold, 2/2.
J W & Co.	5	Good block	bought in.
Galphele	2	,, ,,	bought in.
	1	Scrap	bought in.
		MALAYA.	
Jebong	84	Very fine pale crepe	bought in.
	14	Fine pale crepe	bought in.
	6	Good darkish	bought in.
	7	Good brownish	bought in.
	4	Dark	bought in.
S S B R Co. Ld.	6	Good sheet	bought in.
V R Co Ld. Klang F MS	80	Fine palish and brownish crepe	bought in.
	48	Good dark block	bought in.
P S E	5	Fine sheet	3/8½.
	1	Dark block	bought in.
	3	Wound ball	bought in.
R S R	15	Fine sheet	3/8½ to 3/9.
	1	Good scrap	bought in.
E B & Co.	2	Fine pale and palish sheet	3/8½.
	2	Good sheet and scrap sheet 3/8½, scrap	bought in.
K	2	Fine sheet	bought in.
	4	Good dark crepe	bought in.

A G & Co.	1	Fine pale sheet ...	bought in.
	5	Good brown to dark crepe	bought in.
	3	Fine pale and palish crepe	3/8½ to 3/9.
	1	Scrap ...	2/2.
McI	4	Rough biscuits ...	bought in.
	5	Good scrap & rejections ...	bought in.
	6	Fine sheet	pt. sold, 3/8.
B M & Co.	3	Good scrap ...	2/7½.
	3	Wound scrap, etc. ...	1/9.
	1	Fine sheet ...	3/6.
L E Muar F M S	54	Fine block ...	bought in.
	31	Mottled opaque ...	bought in.
S K R Co. Ld.	5	Darkish crepe ...	bought in.
	3	Good block ...	bought in.
Jugra	1	Dark pressed crepe ...	bought in.
B	3	Dark block ...	bought in.
C M R E Ltd.	24	Fine pale & palish crepe ...	bought in.
	6	Good darkish to dark ...	bought in.
Beverlac	1	Good scrap ...	2/7½.
	2	Sheet ...	bought in.
	5	Dark block ...	bought in.
Yam Seng	2	Rejections ...	bought in.

SHIPMENTS.

Exports from 1st January to 4th October, 1907:—

From Singapore	1,015,063 lbs.
From Penang	305,494 lbs.
Total ...	1,320,557 lbs.

Exports from 1st January to 28th October—From Ceylon:—

1907	401,835 lbs.
1906	277,653 „
1905	111,131 „
1904	57,532 „

(These figures are taken from Statistics published by Messrs. Barlow & Co., of Singapore).

Note.—In our market report, dated the 8th November, the total weights of Ceylon and Malaya rubber were reversed, they should have read: "Ceylon about 8 tons and Malaya over 37 tons."

REGISTER OF RAINFALL AT BOTANIC GARDENS, SINGAPORE, FOR OCTOBER, 1907.

Dates.	Rainfall. Inches.	Rainfall. Cts.	Remarks.
1	...	...	
2	...	...	
3	...	...	
4	...	33	
5	...	40	
6	...	72	
7	...	67	
8	1	03	
9	2	13	
10	...	70	
11	...	...	
12	...	...	
13	...	...	
14	...	...	
15	...	...	
16	...	...	
17	...	...	
18	...	...	
19	...	...	
20	...	...	
21	...	...	
22	...	...	
23	...	...	
24	...	...	
25	...	...	
26	...	...	
27	1	30	
28	...	60	
29	...	...	
30	...	...	
31	...	..	
Total	7	88	

W. FOX,
Ag. Director of Gardens,
Straits Settlements.

Malacca.

Abstract of Meteorological Readings for the month of October, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
		°F	°F	°F	°F	°F	°F	°F	°F	%		Ins.	Ins.
Durian Daun Hospital ...	Not Registered.	151·0	79·1	87·9	68·7	19·2	81·0	1·045	65·8	93·0	W.	10·03	2·75

F. B. CROUCHER,
Colonial Surgeon, Malacca

COLONIAL SURGEON'S OFFICE,
MALACCA, *27th October*, 1907.

Perak.

Abstract of Meteorological Readings in the various Districts of the State for the month of October, 1907.

DISTRICT.	Maximum in Sun.	Temperature.				Hygrometer.			Total Rainfall.	Greatest rain-fall during 24 hours.
		Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Humidity.		
Taiping ...	151	81·04	93	71	22	77·40	854	81	28·12	4·76
Kuala Kangsar ...	...	79·76	95	71	24	75·20	815	80	15·62	3·00
Batu Gajah ...	165	80·18	93	72	21	76·78	873	85	10·60	2·10
Gopeng ...	...	80·43	93	62	31	76·29	852	82	14·69	2·70
Ipoh ...	...	80·02	92	...	...	76·21	855	83	16·22	2·41
Kampar ...	...	79·86	94	69	25	75·60	832	83	11·90	1·60
Teluk Anson ...	...	81·80	93	70	23	77·40	883	81	12·12	3·72
Tapah ...	..	81·03	92	57	35	75·97	829	78	13·79	3·90
Parit Buntar ...	...	81·27	92	71	21	76·91	869	81	10·32	3·10
Bagan Serai ...	...	81·41	91	72	19	77·09	875	82	13·93	3·70
Selama ...	...	81·39	94	71	23	76·67	854	79	12·14	1·70

STATE SURGEON'S OFFICE,

TAIPING, *20th November*, 1907.

M. J. WRIGHT,

State Surgeon, Perak.

Selangor.

Abstract of Meteorological Readings in the various Districts of the State for the month of October, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature. Mean Dry Bulb.	Temperature. Maximum.	Temperature. Minimum.	Temperature. Range.	Hygrometer. Mean Wet Bulb.	Hygrometer. Vapour Tension.	Hygrometer. Dew Point.	Hygrometer. Humidity.	Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
	Ins.	°F	°F	°F	°F	°F	°F	°F	°F	%		Ins.	Ins.
General Hospital, Kuala Lumpur	29·874	141·3	79·4	89·5	70·7	18·8	76·0	0·840	73·6	83	S. W.	12·38	2·43
Pudoh Gaol Hospital ,, ...	...	...	...	...	...	...	...	...	...	...	...	12·24	2·14
District Hospital ,, ...	...	...	...	...	...	...	...	...	...	...	...	12·91	1·45
,, Klang	...	...	...	88·0	70·6	17·4	...	...	...	...	...	7·51	1·28
,, Kuala Langat	...	...	...	...	...	...	...	...	...	...	...	6·88	1·56
,, Kajang	...	...	...	85·2	74·6	10·6	...	...	...	...	...	12·50	2·55
,, Kuala Selangor	...	...	...	87·9	78·2	9·7	...	...	...	...	...	13·07	3·45
,, Kuala Kubu	...	...	...	...	...	...	...	...	...	...	...	10·59	2·82
,, Serendah	...	...	...	...	...	...	...	...	...	...	...	11·21	2·30
,, Rawang	...	...	...	90·3	71·3	19·0	...	...	...	...	...	13·16	2·40
Beri-beri Hospital, Jeram	...	...	...	...	...	...	...	...	...	...	...	11·39	2·10
Sabak Bernam	...	...	...	...	...	...	...	...	...	...	...	4·10	1·52

STATE SURGEON'S OFFICE,

KUALA LUMPUR, *3rd December*, 1907.

A. J. McCLOSKY,

State Surgeon, Selangor.

Pahang.

Abstract of Meteorological Readings in the various Districts of the State for the month of October, 1907.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
	Ins.	°F	°F	°F	°F	°F	°F	°F	°F	%		Ins.	Ins.
Kuala Lipis ...	...	...	78·7	92·0	66·0	19·67	75·50	...	...	...	...	9·05	1·57
Raub ...	...	...	80·3	90·0	68·0	17·7	73·6	...	...	...	...	4·71	1·58
Bukit Fraser ...	...	...	...	...	...	...	...	...	...	...	...	9·17	1·40
Bentong ...	...	...	82·91	92·0	69·0	17·96	75·83	...	...	...	...	7·62	1·86
Temerloh ...	...	...	...	94·0	70·0	...	...	...	...	...	...	5·47	1·96
Pekan ...	...	...	80·0	94·0	71·0	15·7	76·00	...	...	...	...	8·23	2·24
Kuantan ...	...	...	83·1	95·0	68·0	19·7	76·3	...	...	...	...	15·28	4·50
Sungei Lembing ...	...	...	...	88·0	67·0	16·0	...	...	...	...	...	17·26	3·58

STATE SURGEON'S OFFICE,
RAUB, *28th November*, 1907.

W. H. FRY,
State Surgeon, Pahang.

The Duff Development Company, Limited, Kelantan.

Abstract of Meteorological Readings for the month of October, 1907.

District.	Temperature.			Rainfall.	
	Maximum.	Minimum.	Range.	Total Rainfall.	Greatest Rainfall during 24 hours.
	Mean. °F	Mean. °F	Mean. °F	Inches.	Inches.
Kuala Lebir ..	88·6	72·2	16·3	11·70	2·11
Taku Plantation ...	...	...	...	11·79	2·13
Kuala Kelantan ...	85·0	73·0	12·0	12·06	3·14

SURGEON'S OFFICE,
KUALA LEBIR, *29th November*, 1907.

JOHN D. GIMLETTE,
Surgeon.